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Essays on Trade Preferences of the USA and Exports of Developing Countries

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Submitted for the degree of Doctor of Philosophy
University of Sussex
May 2014

Declaration

I hereby declare that this thesis has not been and will not be submitted in whole or in part to another University for the award of any other degree.

Signature:

Edgar F.A. Cooke

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SUMMARY

The African Growth and Opportunity Act (AGOA) and the Caribbean Basin Trade Protection Act (CBTPA) of the USA are trade preference programmes offering reduced tariffs to African countries. We investigate the impact of the preferences on the exports of the recipients in this thesis. Using annual data on mirror exports, macroeconomic, social, cultural and religious variables, we evaluate the impact of the preferences in three different ways—(1) difference-in-differences, (2) quantile and (3) matching estimators. As part of our review of the empirical evidence, we conduct a meta-analysis to summarise the quantitative AGOA literature. This is augmented with a meta-regression to investigate the presence of publication bias. In chapter 3, the first of the three empirical chapters, the question asked is, "has there been an observed increase in the exports of AGOA and CBTPA recipients to the USA compared to their exports to the rest of the world?" The identification of the impact consists of modelling the selection in exporting that occurs and accounting for the zero trade occurring at the HS-6 digit level of disaggregation. One result is that, the impact of the preference varies with the level of product aggregation.

The two remaining chapters focus on the AGOA preference and is identified due to the exogenous provision of the preference. Chapter 4 adopts a matching approach while chapter 5 is based on a quantile regression. The matching estimates providing the mean impacts are negative for exports to the USA compared to the counter-factual. In Chapter 5, we show that, the impact of the preference on the recipients is unequal—oil exporters are the largest gainers. We decompose the impact by using the Oaxaca-Blinder decomposition found in Machado and Mata (2005) for quantile regressions. We find that, the gains to AGOA recipients are confined to the top half of the export distribution—implying that the gains from AGOA are unequal and thus heterogeneous in their impact on the recipients.

Acknowledgements

During the PhD journey several individuals have helped in many ways either by providing advice, friendship or encouragement. If I should list the names of all the individuals it would probably become a second thesis. I am therefore grateful to everyone I have been in contact with, either in BMEC, Doctoral School, Global Studies, IDS or elsewhere in the university. I apologise in advance if I have forgotten to mention your name below.

I am indebted and very grateful to my supervisors Dr. Michael Gasiorek and Professor Barry Reilly who have been an inspiration and source of encouragement. I am also especially grateful to them for research assistantships which have many a time paid the rent. I have interacted with faculty and have benefited from them in many ways. I am especially thankful to Professors Andy McKay and Richard Dickens for teaching assignments as well as research assistantships. Dr Iftikhar Hussain and Dr. Xavier Cirera for research work. Dr ZhenKun Wang, Frank Brouwer, Profs. Andy Newell and R. Toll, Drs. Julie Litchfield, Torfinn Hardin, Peter Holmes and Ingo Borchert for advice and all faculty with whom I have interacted with at the Monday, Wednesday, DPhil seminars or the occasional IDS bar socials. I have also learnt a lot as well as benefited from helpful teaching tips from teaching courses run by Professors Alasdair Smith and Alan Winters, Drs. Shqiponja Telhaj, Torfinn Hardin, A. Chari, Michael Gasiorek and Mike Barrow.

I cannot forget the support of staff from the undergraduate, postgraduate and research enterprise offices of BMEC. Most especially, Gemma, Marci, Jackie, and Anita who have resolved problems with my AT payments and teaching timetable and Janet and Joy who have always responded to my queries.

The economics and SPRU PhD community have been supportive and one thing I am going to miss is the house warming parties, the drinks and our lively interaction. Well I cannot mention all the names but I will attempt a short roll-call here but sorry if I forget to mention your name, but the acknowledgement is already implied, *ceteris paribus*—Gemechu, Francisco Gonzalez, Grazia, Yohannes, Chiara, Hector, Farai, Fola, Pierluigi, Janani, Max, Javier, Ani, Francisco Cabrera, Edgar Salgado, Saki, Malgorzata, Sarah Akuoni, Tsegay, Nemera, Kalle, Pedro, Matteo, Mattia, Guilia, Paola, Amrita, Antonia, Caio, Rashaad, Egidio, Marinella, Mimi, Nihar, Samantha, Sevi, Gustavo, Elsa, Eva, Cecilia, Antonios, Antonio, Marta and everyone else not mentioned have kept me sane. Claudia, Rocio, Boidurjo, Madina, Paul Hammond, Chris Jones and Pascal S., Diego, Lucia, Marco and room mates in Jubilee 201, as well as Christopher Jones, Laurin and other members of the larger economics department have also provided the occasional distraction and interaction necessary during the PhD. Friends in IDS—Mulu, Erick, Charles and others; Johannes and the BMEC football group for providing me with an excuse to spend time away from research. So to all the *Maηtsεmεi*, *Maηyεmεi*, *Dons*, *Commissarios/Ministros*, *Chiefs*, *Maharajas*, *Excellencies*, *Royal Highnesses*, *Imperial Majesties* and so on and so forth I say thanks for the interaction and for sharing the PhD and AT space with me.

There are others outside the economics department who also deserve a special mention for their motivation, support and concern, namely: Patrick Awuah, Professor Nana Araba Apt, Drs. Esi Ansah and Peter Houtzager and Edward Abrokwah. My family have also been wonderful and have been very supportive. I have not forgotten Aunties Esther, Sally, Naa Pee, Aggie, Jackie and Mam Cee; Granny Kate, Uncles Nanabanyin, Kwesi and Kwame. Well once I have mentioned the uncles and aunts as is usual I cannot forget my cousins who have also been supportive. Caite, Doris and Araba have made sure I have not been alone in the UK and I must say those delicious meals have been really appreciated and I cannot forget the bowls of soup, Waakye and Jollof rice Auntie Sally packed in my bag on the occasional trip to London on the FCC train. They have reduced the frequency of my trips to Aldi and Sainsbury and those savings have ended up in paying for the occasional pint that has lubricated the grey cells in my head at the World's End pub. I am also grateful to my brothers Ebo for reducing the financial burden of the PhD by financing the first two years of my PhD and to Nana Edu for his support and encouragement. Kwesi Nyan, Paakow, Kofi, Philip, Aku, Tony, and the Osborne's (Franca, Sandi and family) among others deserve mention also. I am grateful to my extended family and friends in the UK, USA, Ghana and elsewhere in the world.

In the course of the PhD, I have also benefited from useful discussions and interactions with colleagues at the economics DPhil conference, CSAE 2012, 2013, and RES 2013 conferences, Nottingham economics development seminar (for which I am thankful to Natasha and Henry for hosting me) as well as the CEMMAP and PEPA courses at the IFS and UCL. The advanced studies programme at Kiel and the summer school at Centro Studi Luca d'Agliano and other summer schools have thrown more light on the trade literature and applied econometrics and have been useful in understanding some of the models used in my thesis.

Finally I am thankful to my lovely wife, Edem for her patience, understanding, love, support and encouragement.

I dedicate my thesis to the memory of my parents William Kobina and Joyce Cooke (for starting me on the academic journey), also to Ato Cooke (whom I have fond memories of even though I knew him for a very short time), Granny and Princess Awoonor Williams.

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List of Abbreviations

ACP African Caribbean and Pacific

AGOA African Growth and Opportunity Act

AMDS Agriculture, Meat, Dairy and Seafood

ARIMA Autoregressive Integrated Moving Average

ATE Average Treatment Effect

ATPA Andean Trade Protection Act

ATPDEA Andean Trade Promotion & Drug Eradication Act

ATT Average Treatment on Treated

CAFTA–DR Dominican Republic–Central America Free Trade Area

CBERA Caribbean Basin Economic Recovery Act

CBI Caribbean Basin Initiative

CBTPA Caribbean Basin Trade Protection Act

CEPII Centre d'Etudes Prospectives et d'Informations Internationales

CPR Chemicals, Plastics and Rubber

DiD Difference in Difference

DPI Database of Political Institutions

EAP East Asia & Pacific

EBA Everything But Arms

EI Extractive Industry

EU European Union

FAT Funnel Asymmetry Test

FBTWP Food, Beverages, Tobacco, Wood and Paper

FE Fixed Effects

FEM Fixed Effect Models

FTA Free Trade Area

GDP Gross Domestic Product

GLS Generalised Least Squares

GMM Generalised Method of Moments

GSP General System of Preferences

GSP+ Generalised System of Preferences plus

HS Harmonised System

ISOM Iron, Steel and Other Metals

LAC Latin America & Caribbean

LS Least Squares

METE Machinery, Electronics and Transport Equipment

MFN Most Favoured Nation

MRA Meta regression analysis

MST Meta Significance Test

NAFTA North American Free Trade Area

NBREG Negative Binomial Regression

NE & NA Middle East & North Africa

OECD Organisation for Economic Cooperation and Development

OI Other Industry

OLS Ordinary Least Squares

PET Precision Effect Test

PPMLE Poisson Pseudo Maximum Likelihood

PTA Preferential Trade Agreements

RCA Revealed Comparative Advantage

RE Random Effects

REM Random Effect Models

ROO Rules of Origin

ROW Rest of the world

RTA Regional Trade Agreements

SSA Sub Saharan Africa

TALF Textiles, Apparel, Leather and Footwear

UN United Nations

UNCTAD United Nations Conference on Trade and Development

USA United States of America

USITC United States International Trade Centre

VPC Variance Partition Component

WDI World Development Indicators

WITS World Integrated Trade System

WLS Weighted Least Squares

WTO World Trade Organisation

ZIP Zero Inflated Poisson

Chapter 1

Introduction

1.1 Introduction and background

The provision of the African Growth and Opportunity Act (AGOA) to Sub-Saharan African (SSA) countries was one of the major changes in USA–Africa trade relations. This provides a unique setting for a natural experiment in studying the impact of AGOA on beneficiary countries. Unlike the European Union (EU) that provided a choice of preferences to African countries beyond the Generalised System of Preferences (GSP)—the USA only has AGOA for the African countries[1]. The question of whether AGOA has increased the exports of recipients is thus, an empirical question, that is addressed in this thesis. Also of interest, is whether AGOA has succeeded in raising exports of beneficiary countries beyond the initial years of the preference?

We contribute to the existing literature by borrowing econometric tool-kits from other fields of economics to answer the question of whether the impact has been positive for the beneficiaries. The econometric methods we adopt can be considered as new ways of analysing the impact of trade preferences and these methods to the best of our knowledge have not been applied to analysing trade preferences and AGOA in particular. We focus on both the short- and long-run effects of the AGOA policy. We construct a counter-factual to measure the impact of AGOA on the beneficiaries[2]. It is important to construct an appropriate counter-factual that provides a realistic estimate of the impact of AGOA. The counter-factual is constructed in three ways—relying on (a) propensity score matching methods of Rosenbaum and Rubin; (b) exact matching methods of Abadie et al. (2001) and Abadie and Imbens (2011); and (c) the synthetic control matching approach of Abadie et al. (2010, 2012) and Abadie and Gardeazabal (2003). There are some key differences between these three approaches and we find that the synthetic control method provides a more appropriate estimate of the impact in our case. One difference is that the synthetic control approach provides a time series of the outcome of interest allowing the researcher to observe the post treatment trends in the outcome. In addition, the synthetic control approach is more suited to case study analysis and allows one to focus on a single case or country of interest (see Abadie et al., 2010, 2012; Abadie and Gardeazabal, 2003). We discuss these methods including their similarities and differences in more detail in chapter 4.

[1] These include the EBA, the EU-ACP (prior to 2008) and GSP+ preferences that African countries can access.

[2] Beneficiaries, recipients or treated countries are used throughout the thesis to refer to countries that have been provided with the AGOA preference. In chapter 3 beneficiaries and recipients extend to other trade preferences, however, to avoid ambiguity we make reference to the preference being discussed.

Non-reciprocal preferences are reduced tariffs offered to developing countries (by developed and middle income countries) to grant them market access and help them compete with more competitive exporters in the markets of the preference providers[3]. In this regard, the offer is unilateral and recipient countries are not expected to provide similar tariff reductions to the countries offering the preferences. This began with the introduction of the GSP by developed economies in the 1970s and continued into the 1980s and through till today with the introduction of newer non-reciprocal preferential schemes for developing countries. The EU and USA have several of these schemes with developing countries having membership of at least one of these schemes. The special and differential treatment of the WTO allows developing countries to be given special treatment thereby providing lower tariffs compared to other WTO members. The provisions include (1) allowing longer time periods for agreements and commitments, (2) policies increasing trade opportunities for developing countries, (3) measures to safeguard trade interests of developing member countries (4) provision of assistance to developing countries to build their expertise in WTO activities and the implementation of technical standards, and (5) special treatment for least developed country (LDC) members[4]. The existing unilateral preferences of the USA and the EU are compatible with the special and differential treatment provision of the WTO. However, the EU-ACP preferences of the EU were found to be incompatible with this provision and have since 2008 been discontinued and replaced by the Economic Partnership Agreements (EPAs) which are WTO compatible.

There is a large empirical literature that has devoted much attention to the analysis of the impact of trade preferences. The majority of the empirical literature has focussed on the EU's trade preferences (such as general system of preferences (GSP) GSP+, EU-African Caribbean Pacific (ACP) and Everything but Arms (EBA) preferences) with quite a few studying the impact of AGOA. The current research has focussed on the econometric approach to estimating the impact via the gravity equation[5] (see for example, Cipollina and Salvatici, 2010b; Silva and Tenreyro, 2006).

The African Growth and Opportunity Act (AGOA) of the USA is a programme offering reduced trade tariffs to African countries[6]. The purpose of the Act is to grant market access to African countries. In this thesis we contradict the current view that AGOA has increased exports to the USA. We argue that, the increases observed are unequal and that the most benefits have been derived by the largest exporters among the AGOA countries. Furthermore, majority of these gains have accrued to oil exporting countries such as Nigeria, Angola, Chad, Republic of Congo, and Gabon.

Much of the literature has centred on the measurement of non-reciprocal preferences, that is whether to use dummy variables or preference margins to represent the preferences (for example, Cipollina and Salvatici, 2010a). Agostino et al. (2007); Aiello et al. (2010); Brenton and Hoppe

[3]For instance, Brazil, China, and India currently provide some preferential access to their markets.

[4]Available at: http://www.wto.org/english/tratop_e/devel_e/dev_special_differential_provisions_e.htm

[5]Head and Mayer (2013) provides a survey on the right approach to estimating gravity models. Although, not essentially a treatment of trade preferences it comments on the problems of some of the previous literature on regional trade preferences and free trade areas in general.

[6]The literature considers AGOA to be a non-reciprocal preference. However, there are several requirements that prospective African countries need to meet to qualify for the preference. For example, the USA places emphasis on democracy, rule of law, and regular elections; economies should be market-based and not command economies; they should eliminate barriers to trade and investment with the USA; respect American intellectual property and protect it; enact policies to reduce corruption, poverty; eliminate child labour practices; and increase education and healthcare; and protect the rights of its workers (See http://www.agoa.info/index.php?view=about&story=country_eligibility for further information.). Given that African countries need to fulfil these and other requirements for continual eligibility the non-reciprocal nature of the preference can be questioned.

(2006); Brenton and Ikezuki (2004); Collier and Venables (2007); Condon and Stern (2011); Frazer and Van Biesebroeck (2010); Gibbon (2003); Mattoo et al. (2003) and Tadesse and Fayissa (2008) are among the papers studying the impact of trade preferences for developing countries. Others have focussed on the utilization of preferences (Bureau et al., 2007; Nilsson, 2005, 2011; UNCTAD, 2003), there is also a subgroup focussing on preference erosion due to the multilateral liberalization of tariffs (Alexandraki and Lankes, 2004; Francois et al., 2006; Hoekman et al., 2006, 2009; Liapis, 2007; UNCTAD, 2007). Rules of origin that limit the use of preferences are also studied in the literature (Augier et al., 2004; Brenton and Manchin, 2003; Brenton and Özden, 2005; Cadot et al., 2006; Cadot and de Melo, 2007; Edwards and Lawrence, 2010).

The dominant tool used by many of the articles listed earlier in analysing the impact is the gravity model[7]. In using the gravity model, Silva and Tenreyro (2006) have advocated the use of the poisson pseudo maximum likelihood estimator to account for the numerous zeros found in trade data. On the contrary, Cipollina and Salvatici (2010b) find the poisson estimator to be biased and suggest that the Heckman two step estimator is less biased under appropriate identifying restrictions. These methods have been extended to firm level and tariff line data in recent papers (for example, Aiello et al., 2010).

The United States of America (USA) has provided several preferential trade agreements to developing countries. These include the *African Growth and Opportunity Act (AGOA)* offered to selected Sub-Saharan African countries (SSA) and the *Caribbean Basin Trade Protection Act (CBTPA)* which were provided to Caribbean Basin countries[8]. The CBTPA is part of the earlier *Caribbean Basin Initiative (CBI)* which was launched as the *Caribbean Basin Economic Recovery Act (CBERA)* provided to the Caribbean Basin countries in the early 1980s. Although, we focus on the CBTPA preferences which were provided in 2000 we do make references to the earlier CBI and CBERA preferences. There has been much debate in the literature about the impact of these preferences for developing countries. These studies include the impact of AGOA (for example, Brenton and Hoppe, 2006; Brenton and Ikezuki, 2004; Collier and Venables, 2007; Frazer and Van Biesebroeck, 2010; Gibbon, 2003; Mattoo et al., 2003; Páez et al., 2010; Tadesse and Fayissa, 2008) and studies on the *North American Free Trade Agreement (NAFTA)*, *Caribbean Basin Initiative (CBI)* and *Dominican Republic–Central America Free Trade Area (CAFTA-DR)* (Ames, 1993; Haar, 1990; Hornbeck, 2010; Hutchinson and Schumacher, 1994; Ozden and Sharma, 2006; Yeboah et al., 2009).

These studies are mixed in terms of the impact of the preferences on developing countries. We believe that the mixed results can be attributed to the construction of the counter-factual by which the impact of the preferences are measured. In other words, the comparison of the exports of the beneficiaries to the non-beneficiaries need to be more carefully laid out and estimated. Much of the estimation of the impact is based on regression analysis that pools all countries together and returns a mean impact of the programme based on a dummy variable indicating treatment. Collier and Venables (2007); Di Rubbo and Canali (2008) and Nilsson (2005) tend to carry out their analysis by providing a means of measuring the performance of the preferential beneficiaries by comparing

[7] Collier and Venables (2007) is an exception and a few others.

[8] Caribbean and Central American Countries: Anguilla, Antigua and Barbuda, Aruba, Bahamas The, Barbados, Belize, British Virgin Islands, Cayman Islands, Costa Rica, Dominica, Dominican Republic, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Montserrat, Netherlands Antilles, Nicaragua, Panama, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, and Turks and Caicos Islands

their exports to the USA to that of the European Union (EU). This is important in isolating the impact of AGOA given that these countries also export to other regions and also receive preferential treatment from these regions. In chapter 3, we instead control for the exports of the developing countries to the rest of the world. This way, we can account for the various preference programmes and trade agreements existing between the AGOA beneficiaries and their remaining trade partners.

Frazer and Van Biesebroeck (2010) argue that the non-uniform preferences provided by AGOA and its selective choice of countries from within the continent satisfy the requirement for analysing the policy impact of AGOA. The implication of Frazer and Van Biesebroeck (2010) is that, the AGOA preference is exogenous and provides us with a policy experiment to assess the impact of AGOA on the beneficiaries. This in addition makes AGOA exogenous and thus endogeneity of the preferences is not a problem for our analysis. The CBTPA preference was also unilaterally applied to selected Caribbean and Latin American Countries[9]. The variation in countries selected and products covered is employed in the analysis to study the impact of the AGOA and CBTPA preferences on selected products at the HS-6 digit level of trade. Besides, Agostino et al. (2007) also notes that in the absence of these preference agreements, the average level of trade becomes the counterfactual hence, adopting this idea—the introduction of the CBTPA and AGOA would lead to a departure from the normal level of trade. This departure from the normal level of trade can thus be interpreted as the effect of the policy. As discussed in chapter 3 an attempt is made at controlling for any potential endogenous relationships that might exist and be an issue of concern in the analysis.

1.2 Significance and contribution of the thesis

The novel aspects of the thesis lies in the methodological approach undertaken in the empirical chapters. For instance, the meta-analysis of the AGOA literature in chapter 2, the matching analysis in chapter 4 and the quantile regression analysis to show the heterogeneous impact of AGOA in chapter 5 are all new ways of analysing the impact of AGOA. These are the main contributions of the thesis. Although, this is applied to the AGOA preferences of the USA, they can be extended to study other trade preferences on offer.

In particular, chapter 5 provides key insight to the analysis of AGOA, these can be summarised as: (a) the distribution of benefits to recipients of AGOA is unequal with larger exporters and crude oil exporting countries reaping the majority of these benefits; (b) the composition of AGOA countries (in terms of whether these countries consistently maintain the preference throughout the sample or are removed from the preference a number of times) does not change the impact of AGOA in major ways. In other words, excluding countries that do not enjoy the AGOA preference consistently or maintaining them in the analysis does not change the impact of AGOA neither does it remove the unequal distribution of the impact towards oil exporting countries. The differences in the impact are marginal at best—indicating that compositional effects of the choice of AGOA countries does not affect the quantile results; (c) the comparator countries (in this case the counter-factual countries) do not change the result that the impact is heterogeneous; (d) the choice of products included in the analysis are key to the gains observed for the AGOA countries. The gains are

[9] The introduction of preferences in textiles and apparel within the CBTPA preference is used to model this variation in preferences for Caribbean Basin countries

concentrated in a few products. Inclusion of crude oil products widen the unequal benefits—thereby leading to large inequalities in exports of the AGOA recipients. Generally, countries exporting the products offering the gains are the exporters that tend to enjoy the most benefits of their AGOA status.

The lessons therefore in analysing AGOA is that, the choice of countries for AGOA (as well as in this analysis) is not a major deciding factor on the impact of AGOA in the case of a quantile analysis. However, the composition of countries can be important when using other methods based on the mean impact of the preference. It may lead to a reduction of the AGOA impact but does not entirely eliminate it when the comparison is with other developing countries. In terms of methodology, OLS estimates are likely to have heteroscedastic standard errors leading to wrong test statistics. In this regard the recent econometric literature has offered solutions—for instance, the clustering of the standard errors might be useful in reducing heteroscedasticity within the difference-in-differences context. For example, Brewer et al. (2013) and Donald and Lang (2007) provide conditions whereby the problem can be resolved by the use of generalised least squares, cluster-robust standard errors and bootstrapping of the standard errors. While Conley and Taber (2011) and Donald and Lang (2007) provide conditions for identification of the treatment effects in the case where the countries (or groups) are small. Athey and Imbens (2006) provide the case where average benefits can vary across the treated and control countries (or groups). Heteroscedasticity *per se* does not lead to biased coefficient estimates but can lead to wrong inference (see for example, Greene, 2003; Wooldridge, 2002)—in that we might wrongly reject the null hypothesis of "no impact of AGOA" (or fail to reject the null hypothesis as the standard errors have been erroneously computed).

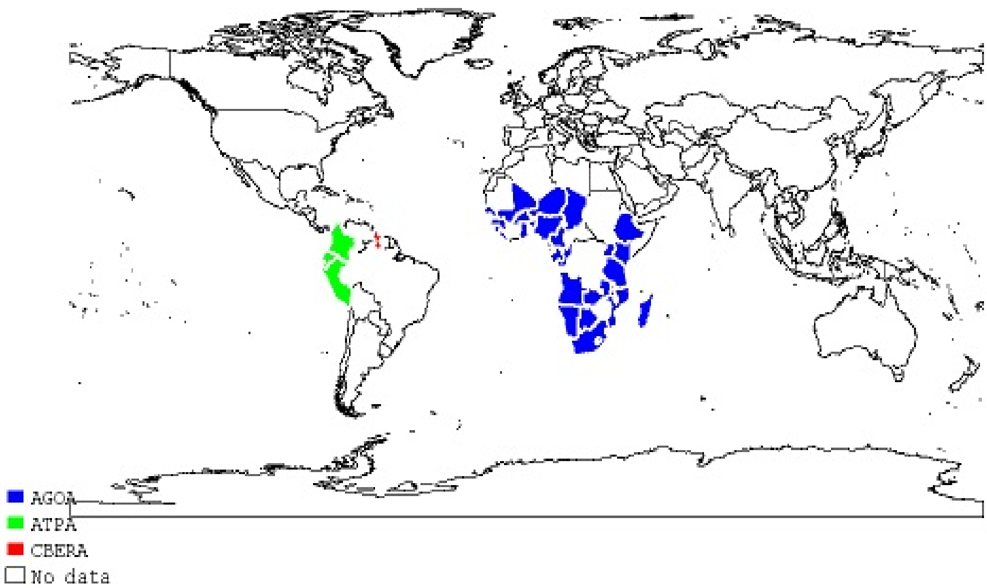
The main issue that might affect the size of the estimated impact is the outlying countries and any endogeneity that might be present. These are likely to overstate the average impact of any least squares estimation performed. The quantile regression which tends to be more robust to heteroscedasticity and outliers compared to OLS would be a more appropriate approach in estimating the impact[10]. A caveat to the quantile regression is that, there have not been applications of this to gravity models and the presence of incidental parameters makes it difficult to incorporate country-year fixed effects in the estimated gravity model. Thus, the application of the quantile regression to gravity equations in chapter 4 provides another contribution to the literature. The median estimate in the results section of the chapter were smaller in magnitude compared to the OLS estimate. We therefore suggest that in studying the impact of trade preferences in general (not only AGOA preferences) the median regression results should be reported together with the least squares or alternative non-linear approaches to provide a more realistic or conservative measure of the impact of the preference. This is mainly because some developing countries are more able to take advantage of the preferences and thus find themselves among exporting nations at the upper tails of the export distribution. The majority of the remaining countries can be found at the lower tail of the distribution.

The summary of the remaining contributions include (a) the generalised least squares (GLS)

[10]Following Athey and Imbens (2006); Brewer et al. (2013); Conley and Taber (2011); Donald and Lang (2007) it is still reasonable to estimate reasonable impacts of AGOA and perform appropriate inference. However, it would be important to take into account outliers during the estimation process. One solution to outliers is the use of an impulse dummy—here a dummy is defined taking the value of one for the outlier and zero for all remaining observations and this becomes an additional variable in the regression analysis.

random effects model is biased and its use in studying preferences leads to highly irregular estimates. On the contrary, using the Mundlak/Chamberlain random effects models reduces this bias in large samples. The Mundlak/Chamberlain device is a good way of controlling for the correlation between the random effects on one hand and the covariates on the other; and (b) we provide a quantitative summary of the literature as well as make inferences about publication bias.

1.3 AGOA and CBI preferences



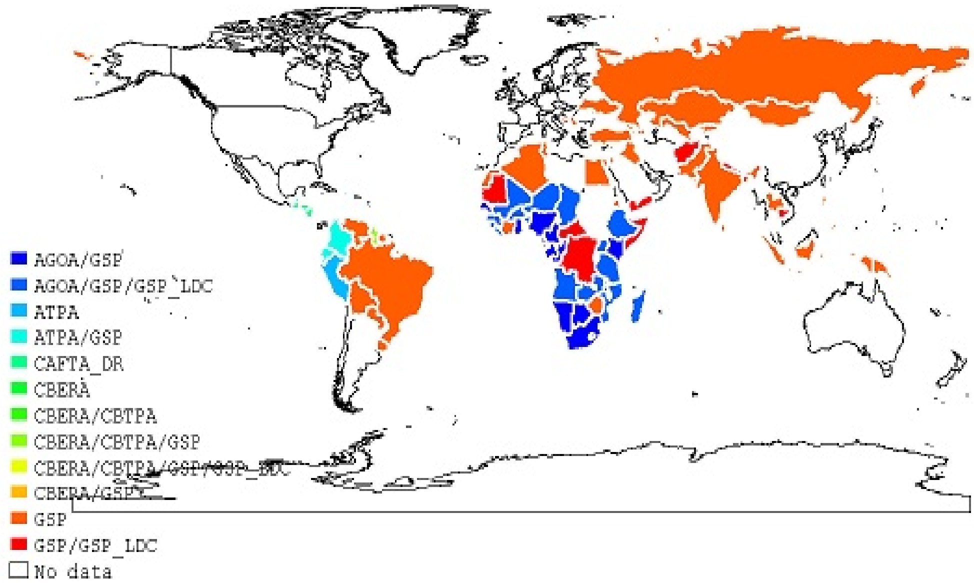
Source: Author's elaboration using map coordinate data from www.mappinghacks.com/data and trade preference data from USITC website

Figure 1.1: AGOA, ATPA and CBERA countries

The AGOA and CBI preferences have undergone several amendments since their inception in 2000 (started in 2001) and 1983 respectively. We provide a summary of these important revisions in the AGOA and CBI preferences below. For the AGOA preferences the following revisions are noteworthy[11]:

- AGOA I - extended GSP product eligibility (4650 products); certain limitations (eg. *competitive needs legislation*) removed; inclusion of 1835 products not covered in the GSP as duty free products.
- AGOA II - (2002) further relaxation of rules of origin in apparel and selected textile articles (eg. towels & blankets, etc); knit-to-shape apparel included; rules of origin relaxed to include yarn; Botswana and Namibia given LDC status; volume cap limit doubled
- AGOA III - extended AGOA to 2015 and apparel provisions to 2007, ethnic printed fabrics added; use of foreign collars and cuffs in domestic garments allowed

[11] www.agoa.info and AGOA reports to congress



Source: Author's elaboration using map coordinate data from www.mappinghacks.com/data and trade preference data from USITC website

Figure 1.2: The various preferences offered by the USA

- AGOA IV - (2006) Access given to LDC AGOA countries for HS 50 - 63; new rules of origin allowing inputs to be sourced from the AGOA LDC group. Third country fabric extended to 2012; increase in volume cap on garments.
- AGOA V - (Nov. 2009) single implementation of rules of origin; harmonisation and expansion of USA preferences and extension of trade benefits currently available.

The CBI has also undergone several phases and these include[12] :

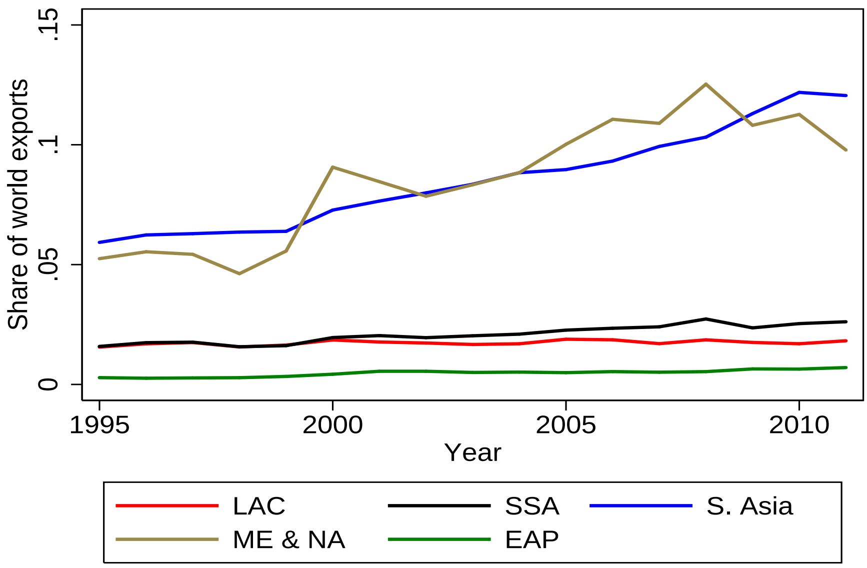
- Launched in 1983 as the Caribbean Basin Economic Recovery Act (CBERA)
- 1984 - 20 countries received benefits (Includes El Salvador, Guatemala and Honduras and Nicaragua in 1990).
- 1990 - CBERA made permanent and amended.
  - 20% tariff reduction on certain leather products
  - Duty free treatment for products using 100% inputs from the US
- 1991 - 94 tariff categories added or expanded
- 1992 - 28 tariff categories added or expanded.
- 2000 - US Caribbean Basin Trade Partnership Act enacted.
  - Added apparel exports

[12] www.ustr.gov/trade-topics/preference-programs and USTR (2009)

- This expires in 2010 (or if an FTA of the Americas comes into force)

- 2002 - CBERA amended
- 2006 - CAFTA-DR benefits begin for Dominican Republic, Honduras, Guatemala, El Salvador and Nicaragua. Costa Rica joins in 2009.
- The CBTPA has however, been extended for the remaining countries beyond 2010.

Figure (1.3) shows that, the Sub-Saharan African (SSA), Latin America and Caribbean (LAC) and East Asia and Pacific (EAP) countries have less than a 5% share of world exports on average. The South Asian (S. Asia) and Middle East and North African (ME & NA) countries have shares of world exports larger than 5% on average between 1995 and 2011. In spite of the low share of world exports, the SSA and LAC countries export on average at least 40% of their exports to the combined EU and USA markets. This share varies for individual countries and ranges between 40% and 99% of their exports. Countries such as Aruba, Cayman Islands, Chad, Dominican Republic, Haiti, and Lesotho among others export over 70% of their total exports to the EU and USA markets. Majority of the LAC countries export less than 20% to the EU market with majority of exports going to the USA market. Haiti for example exports less than 6.5% of its exports to the EU. For SSA, majority of the countries export more products to the EU compared to the USA. Although, some exceptions exist for the major oil exporters such as Nigeria and Angola that export higher shares of total exports to the USA than to the EU.



LAC: Latin America & Caribbean, SSA: Sub Saharan Africa, S. Asia: South Asia, NE & NA: Middle East & North Africa, and EAP: East Asia & Pacific.
Source: Author's elaboration of data from WITS: http://wits.worldbank.org/wits/

Figure 1.3: Share of world exports by region

1.4 Summary of the thesis chapters

In chapter 2, we review some of the empirical literature on trade preferences. We more specifically carry out a meta-analysis of the impact of a specific preference — AGOA, which is the main preference studied in this thesis. The use of the meta-analysis and meta-regression techniques allow us to explain the differences in coefficients reported as well as test for publication bias. We do not find conclusive evidence on the existence of publication bias. However, there is some indication of the existence of publication bias and a genuine empirical effect of AGOA.

Chapter 3 is an empirical exercise on 981 disaggregated HS six digit level products. In addition to studying AGOA, we also look at the impact of similar preferences offered to the Caribbean Basin countries. This allows us to identify the impact of AGOA while controlling for competing preferences that offer similar agreements. The impact of the preferences varies according to the level of disaggregation as well as the group of commodities studied.

Chapter 4 is the second of our three empirical chapters. The analysis focuses on aggregate export data (that is, total rather than product level exports). The approach also differs, as we borrow from the evaluation literature by using the propensity score matching, covariate matching and synthetic control approaches to uncover the impact of AGOA on recipients. The counter-factual is defined using a group of countries very similar to the AGOA recipients. The results are mixed and show that compared to the counter-factual countries, the AGOA beneficiaries exported less to the USA. In using the synthetic control approach we are able to explore the trends in exports of a particular AGOA country with its synthetic counterpart (counter-factual). We find that oil exporting countries show a higher trend in post-AGOA exports compared to the counter-factual. Excluding oil products eliminates most of the positive gap and in most cases reverses the impact—thereby showing the counter-factual trends to be higher than the oil exporting countries in this case. A key result in the chapter and which is supported in the literature is that much of the gains are driven by oil exports. In spite of the gains in AGOA preferential exports, we find that, the GSP and the most favoured nation (MFN) exports of the AGOA beneficiaries were less than that of the counter-factual countries. Moreover, a comparison of the trends in exports by selected countries and their synthetic (counter-factual) counterparts show that Angola, Chad, and Republic of Congo obtain higher exports than their counter-factual countries. The gains are driven by oil exports and are no longer present after excluding oil exports (except in the case of Angola).

Finally, chapter 5 disentangles the effects of the impact on AGOA countries. The matching estimates show that, when comparing total exports of recipients to the counter-factual, there are no significant increases in exports. We try to see whether the impact is heterogeneous. Thus, we compare the impact at the various quantiles of the distribution of exports, to rule out the influence of any outlying countries in the export distribution. Secondly, we also carry out a quantile decomposition to see where the sources of the differences in the impact are obtained from. The decomposition allows us to see whether the impact is due mainly to differences in the characteristics of the AGOA and non-AGOA countries or mainly due to differences in coefficients. The results obtained show that a few countries enjoy the gains of AGOA at the top of the distribution. The majority of countries at the 75th percentile and below show lower exports compared to the non-AGOA countries. Table (1.1) summarises the chapters, methods and results presented in the thesis.

Table 1.1: Summary of thesis chapters and main research questions

Chapter	Research Question	Methodology	Results
1: Introduction	-	-	-
2: Literature & Methodological Review	Is there publication bias in the AGOA literature?	Literature search & review including a meta-analysis and meta-regression analysis.	Significant differences in the estimated AGOA impact can be found in the literature
3: The impact of trade preferences on exports of developing countries: The case of the AGOA and CBTPA preferences of the USA	Has there been an observed increase in the exports of AGOA and CBTPA recipients to the USA compared to their exports to the rest of the world?	Regression analysis: PPMLE, Mundlak RE, random effects & fixed effects	Mixed results: CBTPA preferences on one hand have increased the exports of the recipients while AGOA is mixed
4: Impact of AGOA: A matching approach	a. Can we find a positive impact of AGOA through matching AGOA countries with non-AGOA countries?	1. Propensity score matching 2. Exact mahalanobis matching 3. Synthetic control matching	No significant impact of AGOA is present in approaches (1) and (2). Approach (3) provides mixed results for each country and depending on whether oil products are included in total exports.
5: Is there a heterogeneous impact on exports to the USA	Do we observe an heterogeneous impact on recipients of AGOA preferences?	Quantile regression and decomposition analysis	The effect of the preference is unequal and we find that, the impact is concentrated at the upper tail of the export distribution.
6: Conclusion	-	-	-

1.5 Data

Data for chapter 2 is entirely constructed from the various econometric studies of the AGOA impact. A search for articles was carried out at various periods between January and June 2011 and again in September 2012. The search strategy involved querying the Google search engine, Munich Personal REPEC Archive (MPRA), Google Scholar, ECONLIT, SCOPUS, Wiley Journals, World Bank's JOLIS, Web of Knowledge and JSTOR databases. The following key words "AGOA trade agreement", "economic impact of AGOA trade preferences ", "African growth and opportunity act" and "AGOA trade preferences" were used in finding the studies for the meta analysis. A couple of studies were also obtained from the references of the selected studies. The search led to over 30 studies, however these were reduced to fourteen studies because some of the studies had no econometric content or were analysing other aspects of AGOA.

Data for the analysis is obtained from the World Integrated Trade System[13] (WITS) which queries data from UN Comtrade for export (and import) data and UN TRAINS for the tariff data.

[13]http://wits.worldbank.org/wits/

Gross domestic product data is obtained from The World Bank's World Development Indicators[14] (WDI) and gravity type variables (*viz.*, landlocked, area, latitude, number of cities, official language, etc) are obtained from the CEPII distances database[15]. In addition, our political variables (military and religion) are obtained from the Database of Political Institutions[16] (DPI) and democracy time series dataset [17]. Finally, the preferential dummies are constructed based on information sourced from the WITS preferential database and the United States International Trade Commission (USITC)[18] The remaining variables constructed (*viz.*, RCA and market size) are based on the variables obtained from the sources above. Table (3.1) provides further information on the variables used as well as summary statistics.

Data for chapters 4 – 5 are obtained from the same sources. Data for the outcomes are obtained from the UN-Comtrade and USITC databases. The World Development Indicators and IMFs International Financial Statistics databases provide macroeconomic indicators (such as, gross domestic product, inflation, population, value-added (in industry, manufacturing, agriculture, construction, services, etc), interest rates, exchange rates among others) for the purposes of matching similar countries. Additionally, Kaufmann's Global Governance[19], Database of Political Institutions[20], Polity IV and Bates et al (2005)[21] databases provide political, cultural and religious data to augment the vector of control variables needed to perform a realistic match. Finally, gravity type variables are obtained from the CEPII gravity database [22].

1.6 Outlook

The thesis is composed of six chapters. The next chapter, chapter 2 although contains the theoretical and empirical discussion of the existing literature has a section devoted to the empirical analysis of the estimated impacts of the econometric literature on AGOA. Chapters 3 – 5 are empirical in nature and analyse various aspects of the impact of AGOA preferences on the recipients. Finally, chapter 6 provides a summary of the results presented and concludes the thesis.

[14] http://data.worldbank.org/

[15] Centre d'Etudes Prospectives et d'Informations Internationales: `http://www.cepii.fr/anglaisgraph/bdd/distances.htm`

[16] Thorsten Beck, George Clarke, Alberto Groff, Philip Keefer, and Patrick Walsh, 2001. "New tools in comparative political economy: The Database of Political Institutions." 15:1, 165-176 (September), World Bank Economic Review.

[17] Norris, 2009, `http://www.hks.harvard.edu/fs/pnorris/Data/Democracy%20TimeSeries%20Data/`

[18] `http://dataweb.usitc.gov/`

[19] www.worldbank.org/wbi/governance/

[20] Thorsten Beck, George Clarke, Alberto Groff, Philip Keefer, and Patrick Walsh, 2001. "New tools in comparative political economy: The Database of Political Institutions." 15:1, 165-176 (September), World Bank Economic Review.

[21] Robert Bates ; Karen Feree; James Habyarimana; Macartan Humphreys ; Smita Singh, "Other Political Data (updated 2005)", http://hdl.handle.net/1902.1/14977 UNF:5:XzsUmjt4AZzpm9JB3hO6pA== Murray Research Archive [Distributor] V1 [Version]

[22] http://www.cepii.fr/anglaisgraph/bdd/gravity.asp

Chapter 2

Literature and Methodological Review

2.1 Introduction

In this chapter a brief review of the literature on trade preferences is provided. In the first part, we review the existing theoretical literature on trade preferences. We trace the theory from the earlier works of Adam Smith to the modern discussion of preferential trade agreements (PTA). An empirical and methodological review is also conducted in the second part reviewing various works on the impact of trade preferences with a specific focus on the USA. The final part presents a quantitative summary of the AGOA impact studies. The quantitative summary is conducted using a meta-analysis and meta-regression framework. The chapter is organised as follows, section (2.2) introduces the theoretical literature and framework for the next three chapters. Section (2.3) provides a methodological review of the gravity model. Section (2.4) provides the empirical literature. The next section (2.5), provides a meta-analysis to summarise the quantitative literature as well as a meta-regression to explain the differences in the reported study effects found in the literature. Section (2.6) concludes the chapter. We now turn to a discussion of the theoretical literature and provide a theoretical framework for the remaining chapters.

2.2 Theoretical literature and framework

2.2.1 Preferential trade agreements

Much of the theoretical work on preferential trade agreements (PTA) have largely centred on reciprocal PTAs or what is known as Regional Trade Agreements (RTA)[1]. The majority of the theoretical discussion on non reciprocal PTAs draw upon the earlier work on Customs Union theory. This has led Baldwin (2011, 69) to acknowledge that, there are "conflicting, overlapping, and competing terminologies." Pomfret (2001) and Baldwin (2011) trace the contributions to PTAs to the early writings of Adam Smith, Robert Torrens, Frank Taussig and Gottried Harbeler[2]. In this section, we draw on some of the earlier work and highlight the key areas within this body of literature that helps in thinking through non reciprocal PTAs.

[1] Parts of this section have been included in a chapter in the Handbook of Trade and Development. Cirera, Xavier and Edgar F.A. Cooke (forthcoming), "Trade Preferences"in Oliver Morissey, Ricardo Lopez and Kishor Sharma (eds.), Handbook of Trade and Development. Edward Elgar.

[2] Pomfret (1986, 2001) has a more detailed discussion of these works to which the reader is referred to and it includes the references to the much earlier studies.

Pomfret (2001) notes that, the early contributions dwelled on the impact of the preferences on the giver and not on the recipient. The example offered by Pomfret, is highlighted in his quotation of Adam Smith.

> When a nation binds itself by treaty to exempt goods of one country from duties to which it subjects those of all others, the country or at least the merchants and manufacturers of the country, whose commerce is so favoured, must necessarily derive great advantage from the treaty (Pomfret, 2001, : 177 citing Smith, 1776, bk IV Ch. 6).

On the other hand, Tausig (1892) placed emphasis on the market share of the recipient in the provider's market (Pomfret, 2001). Pomfret (2001) notes that, welfare in Tausig's world largely depended upon the impact on prices. Much of the modern analysis of preferences are largely based on the recipients and how these preferences can improve and enhance market access. The key issues in recent work on non-reciprocal preferences focus on the utilisation of preferences by recipients, preference margins, preference erosion, rules of origin as well as preference rents among others. There have been key developments in the measurement of preference erosion, margins and utilisation (see for instance, Carrère, 2011; Carrère et al., 2010; Fugazza and Nicita, 2013; Hoekman and Nicita, 2011; Low et al., 2009)

Baldwin (2011) incorporates imperfect competition and discusses how industrial location of production can be affected by PTAs. Unilateral tariff reduction by developed countries should make it more attractive for industries to locate in developing countries (Baldwin, 2011). This is expected to occur due to a reduction in "demand-linked causality" which provides locational advantages to locating in the North (Baldwin, 2011). The lower tariffs can then be attractive for firms to situate in the South—near raw material supplies and get access to cheaper labour (Baldwin, 2011). Baldwin (2011) concedes that, most GSP programs have not done much in promoting industrial relocation of production to the South. Páez et al. (2010) provides evidence of the location of firms in Lesotho and a few other countries due to generous textile preferences offered by the USA under the AGOA program. Should unilateral preferences invoke changes in location of production it may thus provide further gains for developing country beneficiaries.

Conconi and Perroni (2011) on the contrary develop a theoretical model to explain whether unilateral trade or reciprocal trade preferences are more useful in promoting policy credibility and liberalization in developing countries. Based on an analysis of a small open developing economy and a large partner where the small country has problems committing to the trade policies it formulates. They examine three scenarios and the possible implications of the scenarios on the small country's ability to maintain consistent trade policy or sustain free trade. The scenarios are (1) the small country maintains its trade policy on its own, (2) unilateral concessions by the large country, (3) reciprocal trade agreement whereby both countries provide each other concessions. Based on their analysis, scenario (3) makes it much easier for the small country to pursue free trade and pursue credible trade policy. The other two scenarios do not help in overcoming the policy credibility of the small country. Its policy credibility depends on how it interacts with the private sector (Conconi and Perroni, 2011)[3]. Scenario (2) resembles the non-reciprocal preference

[3] Conconi and Perroni (2011) provide the EPA arrangements of the EU with ACP countries and AGOA as examples of scenario (3) as these have some elements of reciprocity.

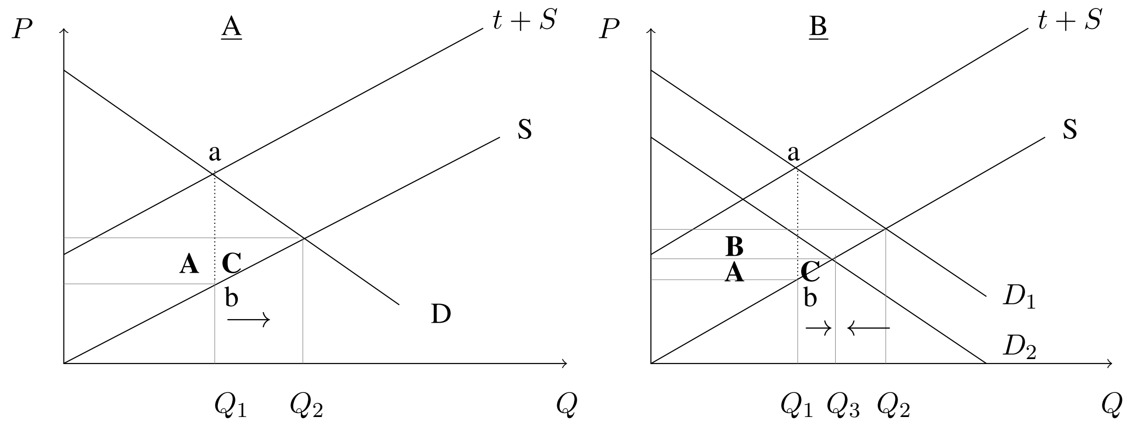
situation and (3) offers the reciprocal PTA scenario. By their submission, the non-reciprocal case does not provide the needed incentives to promote free trade and increase the policy credibility of the recipients. This might explain the over-reliance of developing countries on the largess of developed countries when it comes to trade. Nevertheless, the proliferation of FTAs between the USA and several countries as well as the EU and other countries should lead to more credible policies and a move to free trade—as suggested by scenario (3).

2.2.2 Theoretical framework

The diagram below (figure 2.1) represents the gains that can be obtained by developing countries offered tariff preferences by the North (in panel A) and the losses as a result of preference erosion due to multilateral tariff liberalisation (panel B). In the absence of preferential tariffs in (A) the export supply curve is $t + S$. The distance ab is the height of the tariff applied in the developed country market. The introduction of a non preferential tariff for a subset of countries—created by removing the tariffs on these countries leads to an increase in the supply curve to S. The preference recipients supply more exports to the market and their exports increase from Q_1 to Q_2. As a result Area $A + C$ becomes a transfer of income from the preference giver to the preference recipients.

Pomfret (1986, 2001) refers to area $A + C$ as a transfer of tariff revenue from the preference giver to the developing country. The additional export provides extra producer surplus for the beneficiaries (Pomfret, 1986, 2001). The lower price allows demand to shift away from other higher cost suppliers to the recipient countries (Hoekman et al., 2009). The other suppliers faced with the tariffs thus lose some of their export surplus and this is gained as area A by the recipient countries (Hoekman et al., 2009). However, Hoekman et al. (2009) note that, the impact depends to a great extent on the export supply and import demand elasticities of the exporting and importing countries and the substitutability of the products between the countries among others. Thus, the key gains to be received by beneficiaries largely depends on the elasticities. Larger gains may be experienced by recipients in products that are quite similar and have large elasticities. In addition, where the preference provider has low import elasticities the gains may be much larger. This explains the reason for the large gains in the energy and extractive sectors by AGOA recipients (essentially, the similarity in the product and the elasticities involved).

Panel (B) in figure (2.1) represents the impact of preference erosion on the countries provided with preferential access to the developed country market. The liberalization of MFN tariffs or removal of tariffs for non preference receiving countries leads to the losses shown as area B in the figure. The recipients lose part of area $A + C$ they gained as a result of the preferential tariffs in panel (A)—this loss is shown as area B in panel (B) of the diagram. The impact of preference erosion is thus, a decrease in demand from D_1 to D_2 leading to a decrease in exports by the preference recipients to Q_3. The loss in surplus by the recipient countries is then gained by other non recipient countries. In the presence of more efficient and lower cost suppliers this loss can become larger and create market access problems for the preference recipients. One example is, the reduced gains in the apparel and textile sectors after the removal of the textile quotas (the cancellation of the multi-fibre arrangement). Not only in the textiles sector but also, in other sectors such as agriculture, there has been a gradual multilateral reduction in tariffs due to various WTO rounds and this has contributed to the erosion in preferences of developing countries. Low



Source: Author's elaboration of Francois et al. (2006) and Hoekman et al. (2009)

Figure 2.1: Preference gains and erosion

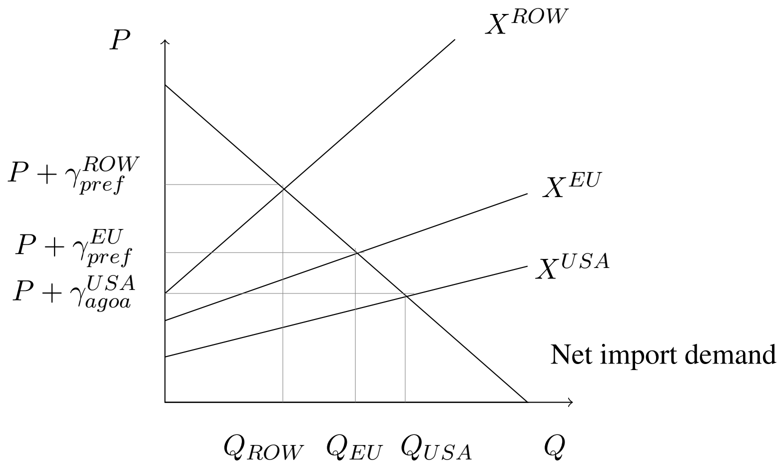
et al. (2009) for instance provide the estimates for non-agricultural market access. They find that, developing countries suffer from preference erosion as a result of the reduction in MFN tariffs. For instance, they report that, the total preference loss by Namibia is US$ 19.7 million as a result of MFN tariff reductions by the QUAD[4] countries and Australia based on the 2003 MFN tariffs. However, after adjusting for competition from non-MFN trade—the loss declines to $ 10.7 million. Similarly, total preference losses for Botswana, Cameroon, Congo, Côte d'Ivoire, Ghana, Kenya and Nigeria are estimated to be 1.7, 2.8, 0.4, 25.3, 19.9, 26.4 and 6.6 million dollars respectively. Incorporating the non-MFN trade adjustments leads to a decline in the estimated preference losses.

A second figure below is used to show the export supply response of the developing countries and to show what happens when they export to other destinations. Given the world net import demand, a typical preference recipient would supply the USA, EU and the rest of the world with their exports. Given various destinations, a typical developing country would make the choice of how much to supply to each destination based on several factors. Chief among these factors, is the proportion of the world price they would receive from exporting to a particular destination. In addition, other factors such as transportation and trade costs as well as the trade policy of the destination would influence their decision[5]. One would expect more exports to be supplied to destinations offering more favourable trade policy in the form of very low tariffs holding transport costs and other costs constant. In the diagram, assuming that the USA provided lower tariffs relative to the EU and ROW, we would expect a larger share of the exports to be delivered to the USA market. Thus, preferential access should lead to a shift in exports from other destinations to the preference giving market in the short-run as preference recipients prepare to increase their export capacity in products receiving preferential access.

Generally, it is expected that, there would be a larger increase in existing exports (intensive margin) than in new product exports (extensive margin)—the preferential tariff encourages more exports in existing exports (the intensive margin) which are easier to increase rather than creating

[4]The four countries Canada, EU, Japan and USA are usually referred to as the QUAD countries in WTO.

[5]Tastes are important also but ignored here to simplify the discussion that follows.



The X's stand for the export supply at the various tariffs. P is the world price, γ_i represents represents competing preferential tariffs offered by each destination.

Figure 2.2: Net Import demand and tariff preferences of three destinations

new exports (the extensive margin). However, Cardamone (2011) and Cipollina and Salvatici (2010b) find the contradicting result of a smaller effect at the intensive margin of exports compared to the extensive margin. In this vein, we would expect a larger impact on the extensive margin of exports to the USA. This is mainly due to the additional products that were included in the AGOA agreement. For example, beneficiaries were offered special market access in textile and apparel products and provided duty and quota free access in specific apparel products. Countries such as Botswana, Ethiopia, Ghana, Lesotho, Kenya, Malawi, Mauritius, South Africa, Swaziland and Tanzania have taken advantage of the apparel provision. This would show as an increase in the extensive margin for the countries that were not exporting apparel and textile products due to existing restrictions imposed by the USA and the multi-fibre arrangement (MFA).

Figure (2.2) shows these probable effects of trade preferences offered by developed economies for a typical developing country. In the diagram, there are three regions, the USA, EU and ROW. Developing countries (and for that matter AGOA recipients) would tend to supply more exports to countries that offer the right price incentives. Here the lower price incentives are offered by providing preferential tariffs that reduce the wedge between the world price and the actual price received by exporters. The higher price received by exporters due to the lower tariff would yield higher exports as exemplified by the export supply to the USA.

2.3 Methodological review: the gravity model

The gravity model is reviewed in this section given its popularity in empirical applications. A number of the studies discussed in the next section are based on a gravity model. The importance of the gravity model in empirical trade has been emphasised by Cipollina and Salvatici (2010a) and Head and Mayer (2013) among other authors. In view of this and given that the gravity model forms the basis of the quantile regressions estimated in chapter (5) we conduct a review in this section. Nevertheless, the approach adopted in chapter (3) has a lot of similarities to the gravity model and this is explored further below.

Cipollina and Salvatici (2010a) conduct a meta-analysis of several studies that have employed gravity models in studying reciprocal trade agreements. This is a small subset of the larger literature using gravity models. The literature has used gravity models for several areas, such as studies on preferential trade, foreign direct investment, transport costs, migration, free trade agreements, regional trade agreements and the impact of disasters on trade among several other areas in the trade literature. Cardamone (2007) is another survey of gravity models in the area of preferential trade agreements. Head and Mayer (2013) is a survey of the estimation and interpretation of gravity models for the analysis of trade flows. Anderson (1979); Anderson and van Wincoop (2003); Anderson and Yotov (2012); Baier and Bergstrand (2007, 2009a); Baldwin and Taglioni (2006); Chaney (2008); French (2013); Helpman et al. (2007); Silva and Tenreyro (2006); Westerlund and Wilhelmsson (2011) and a few others are studies that discuss the methodological and theoretical issues in estimating gravity regressions.

Head and Mayer (2013) distinguishes *general*, *structural* and *naive* gravity models as the three main definitions of gravity discussed in the theoretical and empirical studies of bilateral trade. The general gravity equation in the trade literature according to Head and Mayer (2013) is expressed as:

$$X_{ij} = GE_i M_j \phi_{ij}.$$

Where X_{ij} is exports from country i to j, G is a gravitational constant, E_i represents exporter country characteristics (or as referred to by Head and Mayer (2013)—"*capabilities*"), M_j represents importer characteristics and ϕ_{ij} captures trade costs. The variables E_i and M_j are defined here to be consistent with the model presented in chapter 3. The model can be estimated after imposing a few conditions and expressing E and M as a function of observable characteristics (Head and Mayer, 2013).

The structural gravity is based on the following equation:

$$X_{ij} = \underbrace{\frac{Y_i}{\Omega_i}}_{E_i} \underbrace{\frac{X_j}{\Phi_j}}_{M_j} \phi_{ij}.$$

where, Y_i is the total value of production, X_j is the total value of the importer's expenditure on all exporters, and Ω_i and Φ_j are what Anderson and van Wincoop (2003) refer to as "*multilateral price resistance*" and these are defined as:

$$\Phi_j = \sum_l \frac{\phi_{lj} Y_l}{\Omega_l} \text{ and } \Omega_i = \sum_l \frac{\phi_{il} X_l}{\Phi_l}.$$

Head and Mayer (2013) note that structural gravity can be estimated at either the aggregate or industry level of trade and that empirically, GDP is taken as the proxy for Y_i and X_j.

The final equation for the gravity model is the naive form expressed below.

$$X_{ij} = GY_i^a Y_j^b \phi_{ij}$$

Where Y_i and Y_j are exporter and importer GDP respectively and a and b are the GDP elasticities which are theoretically predicted to be one (Head and Mayer, 2013). The naive gravity equation suggests that trade is proportionally related to the product of the country sizes. A number of studies include the population of the exporter and importer countries as additional variables to account for the size of the countries (cf Baldwin and Taglioni, 2006; Foster et al., 2011).

There are similarities between the approach adopted in chapter 3 and the gravity equations discussed above. In chapter 3, since the dependent variable is defined by dividing exports of country i to j by exports of i to the rest of the world—the exporter country characteristics get cancelled out in the model. Thus, equation (3.3) in chapter 3 is:

$$X_i = M_j d_{ij} \mu_i. \tag{2.1}$$

Where the product and time subscripts have been suppressed. μ_i is an error term, d_{ij} is the between country characteristics and the remaining variables are as defined above. The key difference is the absence of the gravitational constant and the exporter characteristics. However if we incorporated the exporter characteristics and allow $d_{ij} \times \mu_i$ to capture the trade costs and how easily country i can access market j—we can approximate the gravity model above. The remaining difference is that exports are considered to one country and the direction of trade is from i to j excluding flows from j to i. In this thesis, this is the focus of chapter 3. The model can be extended to include additional destination countries as well as look at flows in the opposite direction in which case we can return to a gravity model that resembles the structural or general gravity equation above and thus include a gravitational constant in the equation. This would lead to equation (2.2) which links our approach to the gravity equation.

$$X_i = G E_i M_j \underbrace{d_{ij} \mu_i}_{\phi_{ij}}. \tag{2.2}$$

In implementing our proposed model in chapter 3 we include country-product-time fixed effects to capture the constant aspects of the trade relationship such as distance and the time varying aspects of the preferences. In a gravity framework this would capture the multilateral price resistance terms thereby reducing any omitted variable bias. The rest of the discussion of the empirical model and its implementation is discussed in section (3.3.2) of chapter 3.

The empirical estimation of the gravity model is done by taking logs of the particular definition chosen. Taking the logs of the structural gravity equation then gives us:

$$\ln X_{ij} = \ln G + \ln E_i + \ln M_j + \ln \phi_{ij}. \tag{2.3}$$

The naive estimation which Head and Mayer (2013) finds to be inconsistent with theory, adopts the log of GDP (in some cases, log of population), distance, adjacency, whether the country pair have a common language, historical tie, or are landlocked. This estimation form omits the multilateral price resistance terms and Baldwin and Taglioni (2006) have called this the "*gold medal mistake*" in gravity estimation. They also suggest a "*bronze medal mistake*" which involves deflating the dependent variable (trade flows) by the USA price index—this according to them is not as serious as the *gold medal mistake*. The other mistake is the "*silver medal mistake*" where the dependent variable is considered as the average of two way exports rather than the uni-directional flow of exports[6]. It is has become common for the problem of the omitted multilateral resistance term to be solved by incorporating country dummies in cross section estimates while country and year fixed effects are used for panel data (see for example, Baier and Bergstrand, 2007; Baldwin and Taglioni, 2006; Head and Mayer, 2013).

In the analysis of free trade agreements (FTAs) Baier and Bergstrand (2007) suggest that that FTAs are endogenous. On the contrary, we think the AGOA preference is exogenous and thus endogeneity is less of an issue in our case. The difficulty in finding potential instruments to suitably handle the right hand side endogenous variables is also highlighted by Baier and Bergstrand (2007). The sources of bias are omitted variables, simultaneity and measurement error which lead to inconsistent estimates (cf, Baier and Bergstrand, 2007; Wooldridge, 2002). These are the potential sources of endogeneity for FTAs and can be likely sources in the analysis presented in the thesis. Baier and Bergstrand (2007) discounts the endogeneity of GDP explaining that, GDP as a function of net exports is a small share of GDP—hence it does not create serious problems to the unbiasedness of the coefficient estimated. The share of net exports as a percentage of GDP is potentially less than 5% and its connection to exports is not direct. The remaining gravity variables, distance, adjacency and common language are potentially exogenous (Baier and Bergstrand, 2007). Issues of selectivity can be handled within the Heckman selection approach while omitted variables, that is the multilateral price resistance terms can be handled within the fixed effects approach using country and time fixed effects as mentioned above[7].

Generally, the exclusion of the country-year fixed effects leads to inconsistent estimates as the multilateral resistance terms have not been accounted for in the gravity regression. An alternative approach to solve the problem of the multilateral resistance terms has been suggested by Head et al. (2010) (and also in Head and Mayer, 2013) which requires the dependent variable of the gravity regression to have a reference exporter and importer country. The method known as *Tetrads* requires defining a new dependent variable—a *"tetradic"* term of the ratio of exports from country i to n and l to n. The reference exporter is thus applied to the numerator and the reference importer to the denominator—this is the case for bilateral two-way trade gravity regressions. Thus the dependent variable becomes,

$$\frac{X_{in}/X_{ik}}{X_{ln}/X_{lk}}.$$

Where the subscript "in" indicates exports from country i to n and the reference exporter is l and the importer is k. Head et al. (2010) and Head and Mayer (2013) suggest that this attenuates the bias of omitting the country-year fixed effects. Essentially, the procedure can lead to the multilateral terms cancelling out and thus not requiring the terms to be estimated. In our application here, we only consider exports in one-direction, that is exports to the USA. Thus, our ratio of exports to the

[6] Other forms of this error is the averaging of imports and exports for each bilateral pair or sum of these. For instance, the right form of the dependent variable should consider Ghanaian exports to the USA as one bilateral pair and USA exports to Ghana as another bilateral pair—not the average of these two flows. The flaw from estimating gravity this way is that it is not theoretically consistent with the gravity equation and can lead to biased coefficient estimates. Baldwin and Taglioni (2006) have an extended discussion in their article. Cipollina and Salvatici (2010a) also discuss these medal mistakes in their paper.

[7] Baier and Bergstrand (2007) also suggest that first differencing is useful in cases where T is large and the errors are serially correlated.

USA divided by exports to the EU or ROW in chapter 5 and the model described above for chapter 3 is useful in approximating the *Tetrads* approach.

2.4 Empirical literature

2.4.1 EU and USA trade policy

Tadesse and Fayissa (2008) use HS-2 digit data to analyse the impact of AGOA on exports of eligible countries to the USA. In doing this they adopt a gravity model and they also separate the AGOA impact into intensive and extensive margins[8]. In addition to the standard gravity variables they include the stock of immigrant population (per country) in the USA, dummies for landlocked, AGOA eligibility, English language, an index of economic openness, years elapsed under AGOA, lagged imports and time and country effects. Using a tobit estimation technique they carry out regressions for each HS-2 digit product (that is chapters 00 – 99) and decompose the coefficient of the AGOA dummy into extensive and intensive margin effects.

Generally, the gravity coefficients had the expected signs—distance (-0.5) and economic size (0.495) for HS 03 products (that is fish and crustaceans). Moreover, USA population and income levels had no significant impact on AGOA imports in several of the HS-2 categories. As reported by Tadesse and Fayissa (2008), coffee, tea and spices; knit; and non-knit apparel articles increased exports of SSA countries by 5.2%, 43.5% and 16% on average respectively. Furthermore, AGOA had approximately a 64% increase in HS-03 exports although it was insignificant. Of the 32 estimated coefficients for the AGOA dummy reported in the article 17 were significant—namely, HS-04, HS-05, HS-07, HS-09,HS-15, HS-21, HS-22, HS-33, HS-39, HS-40, HS-44, HS-57, HS-60, HS-61, HS-62, HS-85 and HS86 had significant coefficients. The lag of the dependent variable (0.65) was significant in most of their regressions. They reported both positive and negative immigrant stocks in several cases. The extensive and intensive margin effects reported by them for HS 01 products were 0.09 and 0.5 respectively and significant. In relation to the decomposition, only a few products recorded significant values for both effects—much less than the 24 significant extensive margin effects across products.

Collier and Venables (2007) estimate the impact of trade preferences on exports of developing countries to the USA relative to the EU using total apparel exports. Their total sample was 110 developing and middle income countries resulting from selecting countries with mean apparel exports of US$ 100,000 and above. They capture the AGOA impact through a dummy variable indicating when the country was given AGOA preferences. The main regressions are also estimated for a sub sample of 86 countries whose apparel exports were US$ 1 million and above during 1991 – 2005. The coefficients for AGOAA (AGOA apparel dummy) in their first three regressions were significant and varied from 2 to 2.21. The coefficients signify the strong impact of AGOA in increasing exports to the USA relative to the EU in apparel products. The actual impact on exports to the USA compared to the EU is given by the exponents of 2 and 2.2 which are 7.4 and 9.1 times the exports to the EU respectively. The result signifies an increase in AGOA country exports to the USA relative to the EU by a multiple of 7.4 and 9.1 respectively.

[8] They use the terms import initiation - creating new imports (extensive margin) and import intensification - the volume effect on USA imports (intensive margin).

They had another dummy capturing the effect of the EU's Everything but Arms (EBA) preference on these countries. In order to identify the effect of the EBA they restricted their dummy to countries that were ineligible for the European Union–African Caribbean and Pacific (ACP) preferences (this they call EBANC). This variable was not significant and in most cases had the wrong sign. Similarly, using the EBA dummy in its place—it was also not significant and showed the wrong sign. Three subsequent regressions with 110 countries correct the sign for the EBA dummies and produces a marginal increase in the AGOAA coefficient. A quadruple difference in difference method to sort out the effects of having between country characteristics vary over time is also used. In the two regressions carried out with this method, the AGOAA effect recorded significant values (2.65 and 1.98 respectively). The first regression excluded the AGOA and EBANC terms. They therefore confirm that, AGOA had a large impact on its beneficiaries. We depart from Collier and Venables (2007) by expanding our product coverage[9] as well as working with HS-6 digit trade data in chapter (3). Chapters (4 & 5) use a different methodological approach. Secondly, we also consider preferences offered to the Caribbean Basin countries (CBTPA). And finally, we control not only for exports to the EU but also exports to the rest of the world.

Nilsson (2005) and Di Rubbo and Canali (2008) who instead employ a gravity model do not find such strong results for AGOA in their sample. It must, however, be noted that these studies did not use the same product groups and level of aggregation. Nilsson (2005) explored the effects on total exports while Di Rubbo and Canali focussed on agri-products. Collier and Venables on the other hand, limited their analysis to apparel. In summary, Nilsson (2005) and Di Rubbo and Canali (2008) did not find significant trade creating effects for AGOA. EU trade policy was found to be more trade creating compared to AGOA.

Nilsson (2005) in a study of EU and USA trade policy for 158 developing countries apply a standard gravity model in estimating the trade effects of the trade policies. Their results confirm a stronger trade creating effect of EU policy compared to the USA trade policy. However, one drawback is that, the study did not account for the zero exports in the model estimated[10]. This is presented as a censoring problem in the econometrics literature and can create significant biases in coefficient estimates thus making them unreliable for inference (Cameron and Trivedi, 2005; Greene, 2003; Jensen et al., 2002; Wooldridge, 2002).

However, Nilsson's (2005) cross section estimation using the 2001 – 2003 annual average exports lessens the impact of the censoring problem. Essentially, by taking the average exports for the period they are able to fill in the missing observations for particular years by using the average exports for the period available (in other words reducing the missing or zero exports). The coefficients of both sets of regressions (that is, the 2001–2003 average and the 2001–2003 panel analysis) are similar; however, the t-statistics estimated in the 2001 – 2003 panel are twice the cross-section estimates indicating the potential bias of ignoring the censoring of the dependent variable in his model. The reported trade creation values for the cross-section regression[11] include

[9] We go beyond apparel products to include all six–digit products within the following categories: live animals; meat and edible meat offal; salt, sulphur, earth and stone, plastering; ores, slag and ash; and textile products.

[10] Nilsson (2005) in Section 4, the last paragraph of the gravity model sub-section makes reference to the zero exports—"No particular attempt is made to deal with the zero-or missing value observations in the trade data" The countries with zero or missing trade data can be found in footnote 32.

[11] It is converted from actual EU imports from developing countries normalized by the transformed dummy coefficient of the relevant dummy for EU imports, and various income groupings.

EU imports: 35.6%; low income countries: 50.3%; lower middle income countries: 22.9% and upper middle income countries: 46.2%. The percentage indicates the amount of trade generated by EU trade policy (in terms of preferential programmes provided to least developed countries) compared to USA policy. Thus the 50.3% reported for low income countries imply that EU policy is associated with 50.3% more exports compared to USA policy for low income countries. All but lower middle income countries had significant coefficients in the cross-section regression. The coefficients for the panel regression are not discussed in this section due to the potential bias in the coefficients identified above. Finally, the average estimate of gross creation by EU policy for the period 2001 – 2003 was 70.2%, 59.3% and 54.2% of total imports by the EU from developing countries for lower income, lower middle and upper middle income countries respectively (Nilsson, 2005). This is an indication of the size of the gross trade creation by the EU trade policy.

Di Rubbo and Canali (2008) in a study of 102 developing countries for the period 1996 – 2005 for agricultural products (food and fibre products) use a similar methodology to that of Nilsson (2005). They find EU trade policy to be more effective at creating trade than USA policy. They report gross trade creation coefficients of 75.9%, 62.2%, 90.4% and 69.1% for low income, lower-middle income, upper-middle income countries and EU imports respectively for the period 1996 – 2000. Higher percentages are recorded for the period 2000 – 2005 of 80.8%, 63.1%, 91.4% and 73% for low income, lower-middle income, upper-middle income countries and EU imports respectively. A similar interpretation to Nilsson's can be given to Di Rubbo and Canali—however, EU policy generates more exports of agri-products compared to the USA. They find the trade variation to be significant for the lower income group. Compared to Nilsson (2005) the trade creation effects are stronger for the upper-middle income countries rather than the low-income countries. We note that, these effects are confined to the agri-food sector not total exports as was the case in Nilsson. Also, the reported coefficients of Nilsson above, are for his cross-section regression and therefore exclude the time variation provided by Di Rubbo and Canali (2008).

Focussing on the USA, Frazer and Van Biesebroeck (2010) estimate the impact of AGOA at the HS 6 – digit level using standard difference-in-differences and triple difference-in-differences—controlling for baseline levels of imports, country and product specific import trends after the adoption of AGOA. They find an increase of 42% of imports on average as a result of the AGOA preference. However, they estimate the causal impact of AGOA to be lower at 28%—they argue that this controls for both the pre- and post-import differences for both AGOA and non AGOA countries—as well as control for product-specific trends common for both groups of countries. On the contrary, concentrating on only non-oil imports they find that AGOA raises exports by a lower amount of 6.6% for the AGOA beneficiaries.

In summarising, Collier and Venables (2007); Frazer and Van Biesebroeck (2010); Gibbon (2003); Páez et al. (2010) generally find apparel and textiles as well as oil and energy products to be the main drivers of the gains by AGOA beneficiaries. We do not observe this for apparel and textiles but do observe this of the extractive industry in chapters (4 & 5) and it is further discussed in the results section of each chapter[12]. Gibbon (2003) and Páez et al. (2010) discuss the proliferation of

[12]In chapter (3) we do notice some positive impact of apparel and textiles for the AGOA countries. This is done at a finely disaggregated level and hence we are able to pick up the increases in particular products within this sector. Chapters (4 & 5) perform the analysis at a more aggregated level and makes the comparison with respect to a particular group of countries. The results show that AGOA exported less of these products relative to the group of countries they are compared with.

firms in the textile industry and the enormous impact on employment in that sector for Lesotho and other African countries. This according to them is not limited to apparel but also to oil and energy related exports where the example provided is the increase in investments in Nigeria's energy sector. Nonetheless, for Lesotho in spite of the record investments an impediment in having further investments was the constraints on land available (Gibbon, 2003). Had these constraints not existed a much stronger impact of AGOA might have ensued.

In an extended survey of previous empirical studies, Mold (2005) links the mild impact of AGOA to (1) the limited benefits and exclusion of sensitive products from the AGOA list, (2) the initial 8-year life span of AGOA with the subsequent extension in 2004 (of AGOA) to 2015 has not encouraged long-term investments for investors who have been given a short horizon to work with, (3) the fear that preferential access and new trade agreements under discussion if offered to the Middle East and Central America would dampen any benefits offered by AGOA and (4) Arbitrary use of AGOA ROOs in certain products. An example offered by Mold is the near-exclusion of Kenya due to its inability to meet ROOs in textiles. Mold (2005) brings to the fore the impact of the AGOA conditions on freedom of policy making and the uncertainty created by the periodic (annual) review of AGOA beneficiaries.

2.4.2 Impact of AGOA on SSA countries

We now focus briefly on the empirical literature that estimate the impact of AGOA on its beneficiaries. The results presented in the literature are mixed and vary in terms of the size of the AGOA impact. Studies such as Collier and Venables (2007); Frazer and Van Biesebroeck (2010) and Nouve (2005) do find all their impacts to be positive. On the contrary, studies such as Giovannetti and Sanfilippo (2009); Lederman and Özden (2007); McKay (2012); Mueller (2008); Nouve and Staatz (2003); Seyoum (2007); Tadesse and Fayissa (2008); Tadesse et al. (2008) and Zappile (2011) do report mixed coefficients. The direction of the impacts and size vary with the level of disaggregation of exports, the products chosen, the period covered by the study, the definition of the dependent variable and the estimation method used. In this section, we review the evidence presented in a few of the papers. Table (2.1) below provides a summary of existing studies on AGOA. We recap briefly some of these papers below.

Table 2.1: Summary of the empirical literature

					Estimated coefficients			
Authors	Years	Countries	Data	Methodology	Mean	Min	Max	Number
Collier and Venables (2007)	15	World	Apparel & Textiles	OLS	2.086	0.900	2.650	9
Frazer and Van Biesebroeck (2010)	9	AGOA/World	All HS8 digit	OLS	0.308	0.030	0.452	4
Giovannetti and Sanfilippo (2009)	11	Africa	ISIC 3 - 6 digit	2SLS/GMM/OLS	0.030	-0.135	0.143	22
Lederman and Özden (2007)	1	World	Total trade	Tobit/Heckman	1.138	-0.811	2.027	5
McKay (2012)	21	AGOA & dev	Apparel & Textiles	OLS	0.129	-0.140	0.365	4
Mueller (2008)	11	AGOA	Total non oil	OLS	-0.163	-0.163	-0.163	1
Nouve (2005)	9	Africa	Total exports	Sys./diff. GMM	0.174	0.040	0.220	16
Nouve and Staatz (2003)	4	AGOA	Agricultural exports	OLS	159.546	-0.145	769.500	18
Seyoum (2007)	8	AGOA	Total imports	ARIMA	-0.929	-11.921	0.540	14
Tadesse and Fayissa (2008)	16	AGOA	All HS 2 digit	Tobit	1.010	-2.120	3.457	32
Tadesse et al. (2008)	16	AGOA	Total imp./SITC 1 dig.	Tobit	0.486	-1.224	2.912	13
Zappile (2011)	11	AGOA	Non Oil	OLS	-0.141	-0.141	-0.141	1

The summary above shows the distribution of coefficients in each study as well as the number of coefficients estimating the impact of AGOA. The above information forms the basis of the dataset used in the meta-analysis and regression in section (2.5). Even though the significant coefficients are not shown, these can be seen in figure (2.7) in section (2.5). Source: Author's elaboration of the empirical literature discussed above

Lederman and Özden (2007) focus on geographical and political determinants to identify the impact of USA's trade preferences. The estimations are based on the gravity model. Unlike the literature focussing on the AGOA impact, they reviewed additional preferences offered by the USA to other regions of the world. They find that most preference beneficiaries increase their exports up to three-fold relative to countries excluded from receiving the preferences.

Nouve (2005) uses various dynamic panel estimators to estimate the impact of AGOA. Forty-six African countries are selected for the study covering the period 1996 – 2004. His approach is a departure from existing approaches—since the literature avoids using lagged values of the export variable to identify the impact of AGOA. The gravity model is the main specification adopted for the estimations. Nouve (2005) concludes that the contribution of an increase in AGOA is 16 – 20 cents for every dollar increase in exports to the USA. A contrary result found by Nouve (2005) to the earlier literature, is that, apparel and textiles did not yield significant increases in total exports[13].

Nouve and Staatz (2003) using quarterly data for a sample of 46 African countries find inconclusive evidence on the impact of AGOA[14]. Their analysis focusses on the agricultural sector and there is limited evidence of a strong impact in this sector within the existing literature. One might attribute this effect to the strong subsidies the EU and USA have on their domestic agricultural sector.

Giovannetti and Sanfilippo (2009) is the second paper presented that departs from the traditional impact studies. They measure the impact of Chinese exports on AGOA exporters. They analyse whether the Chinese exports have crowded-out African exports to the American market. Based on disaggregated data on 48 African countries for the period 1995 to 2005, they find evidence of Chinese exports displacing African exports to the USA. This tends to support the lower impact observed for certain sectors such as textiles in recent studies.

Mueller (2008); Seyoum (2007) and Zappile (2011) do not find any significantly positive impacts of AGOA[15]. Finally, the remaining studies, Collier and Venables (2007); Frazer and Van Biesebroeck (2010) and Tadesse and Fayissa (2008) have been discussed in the previous section and hence only mentioned here and included in table (2.1).

2.4.3 Caribbean Basin Initiative (CBI) and Caribbean Basin countries

The Caribbean Basin Economic Recovery Act (CBERA) was less effective than the Caribbean Basin Trade Protection Act (CBTPA) (Hornbeck, 2010). However, this is explained by Hutchinson and Schumacher (1994) to be a result of (a) over-reliance on the market mechanism, (b) the exclusion of important Caribbean Basin products such as textile and apparel as well as tourism products hindered

[13]Recent work by Rotunno et al. (2012) also note that that China accounted for a large majority of apparel exports of Botswana, Kenya, Lesotho, and Madagascar. The apparel exports of these countries and a few others were mainly due to Chinese 'transshipments' to take advantage of the favourable rules of origin of AGOA at the time. The 'transshipments' have declined markedly since the removal of quotas by the USA on Chinese apparel exports. Similarly, McKay (2012) finds that the end of the multi-fibre arrangement (MFA) has reduced the advantage AGOA recipients had in apparel and textiles. Moreover, he questions whether AGOA played any role in the success of apparel—rather, he attributes the success partly to the existing multifibre arrangement at the time.

[14]The maximum estimate of 759.5 which seems out of place in table (2.1) is due to having the dependent variables in levels rather than logs. However, for the regressions based on a log definition of the dependent variable the coefficients reported on the AGOA dummy are less than 2. Again, this points to how the definition of the dependent variable can influence the estimated impact of AGOA.

[15]Both Mueller (2008) and Zappile (2011) use a *Prais-Winsten* transformed least square regression while Seyoum (2007) adopts an *ARIMA* time series estimation method.

the reaping of its potential benefits, (c) the re-imposition and tightening of USA sugar quotas and (d) the falling world prices of petroleum and petroleum products. This has led some authors to conclude that CBERA failed to achieve their mandate of increasing economic growth in the region (for example, Ames, 1993; Hornbeck, 2010; Hutchinson and Schumacher, 1994). Nonetheless, the CBTPA which had a large impact on the recipients also met with a decline as a result of the introduction of the Dominican Republic–Central America Free Trade Area (CAFTA-DR).

Hornbeck (2010) argues that CBI beneficiaries have suffered from erosion of their preferences as a result of the increasing move towards the adoption of *free trade agreements (FTA)* by the USA. The North American Free Trade Area (NAFTA) after its adoption, curtailed the trade advantage of the Caribbean Basin Initiative (CBI) countries over Mexico—thereby giving Mexico some advantages in apparel and other products Mexico was more competitive at producing than the Caribbean Basin countries (Hornbeck, 2010; Hutchinson and Schumacher, 1994). Hutchinson and Schumacher (1994) in calculating the revealed comparative advantage (RCA) of Mexico and the Caribbean countries in their top 30 export products did find the Caribbean countries to be competitive in 20 out of their top 30 industries and expected this to provide some buffer against NAFTA. The adoption of the CAFTA-DR has in particular, adversely affected the remaining Caribbean countries within the CBI and again reduced their trade advantage in apparel and textiles and non-primary commodities (Hornbeck, 2010). The main reason provided by Hornbeck (2010) is due to the cummulation rules in apparel production among NAFTA, CAFTA-DR and Haiti which leave the remaining countries under the CBI with limited ability to adapt to the new competition from these regions. The percent of apparel imports in total USA imports of apparel is even lower—this fell from 13.6% in 2005 to 1% in 2008 (Hornbeck, 2010). Hornbeck (2010) attributes this to the CAFTA-DR. The CAFTA-DR countries excluding Costa Rica accounted for 90% of total apparel imports of all the Caribbean Basin countries (Hornbeck, 2010) and this accounts for the vast shortfall.

Hornbeck (2010) shows that only 7.5% of total imports from CBI recipient countries were eligible for preferential tariffs after excluding CAFTA-DR and energy exporting countries. This is what might be driving our negative coefficients discussed in chapter (3) of this chapter. In addition, Hornbeck (2010) finds that the following additional factors contributed to the diminishing preferences (a) CAFTA-DR countries produced most of the apparel and textile products (b) the remaining CBI countries are not competitive in the apparel sector and have been unable to take advantage of the preferences and (c) The removal of the *multifibre agreement (MFA)* on textiles has furthered heightened their situation. It must however, be added that some of this might also be due to AGOA countries such as Lesotho and Kenya (and other smaller AGOA recipients) gaining a foothold in the USA market in the apparel and textile sector.

2.5 Meta-analysis

There have been several studies on the impact of the African Growth and Opportunity Act (AGOA) of the USA on Sub-Saharan African (SSA) countries. The estimates reported in these studies vary widely and differ in terms of econometric methodology applied as well as the level of aggregation of the dependent variable (exports and/or imports). A convenient way of summarising the coefficients reported in selected studies is by pursuing a meta-analysis. This is pursued in this section of the chapter using some of the recent advances in meta-analysis and meta-regression analysis (MRA). A recent systematic review by Condon and Stern (2011) summarising the findings of twenty-one econometric and non-econometric AGOA studies show that (1) exports from SSA have increased since the inception of AGOA and (2) Apparel is significantly correlated with higher exports. This section of the chapter seeks to go beyond Condon and Stern's systematic review by performing a meta regression analysis (MRA) on studies that estimate the impact of AGOA on SSA countries.

The main contribution is extending the work of Condon and Stern (2011) to incorporate a quantitative summary of the AGOA literature. To the best of the knowledge of the author, this is the first attempt to investigate the AGOA literature (and to some extent, trade preference literature) using a MRA approach. Hence a novel approach to the study of AGOA is presented in this chapter. Meta-analysis (MA) has now become a popular way of summarising quantitative analysis (Borenstein et al., 2009; Stanley, 2005). There has been a growing number of meta-analytic studies in several areas of economics (for example, Cipollina and Salvatici, 2010a; Doucouliagos, 2005; Doucouliagos and Stanley, 2009; Feld and Heckemeyer, 2011; Rose and Stanley, 2005, among others). In this chapter, our focus is on the application of MRA towards assessing publication bias in the AGOA literature. The closest study to analysing trade preferences is Cipollina and Salvatici (2010a). They apply MRA to the study of several reciprocal trade agreements that have been ratified by the World Trade Organisation (WTO).

Several studies exist analysing the AGOA preferences of the USA towards SSA countries. In spite of these studies there are only a few that make use of econometric methods to estimate the effects of AGOA and this limits the number of studies we can include in our meta-analysis and MRA. However, the individual studies do report several coefficients, thereby increasing our sample size. The results of the AGOA studies have been mixed—reporting varying estimates of the impact of the preference as discussed in section (2.4). In terms of methodology, several econometric approaches have been undertaken. In the EU preference literature, gravity models applying *Heckman selection* and *Poisson* models tend to be very popular. However, in the AGOA literature gravity modelling is less popular. Much of the analysis are based on estimating import demand equations with one study (Seyoum, 2007) applying *arima* time series models. We do investigate whether these various specifications do affect the impact measured.

The choice of studies is based on whether the AGOA impact is estimated and whether they employ econometric techniques in measuring the impact of AGOA. A large number of AGOA studies employ non econometric techniques in studying AGOA. Thus, after dropping the non-econometric studies we are left with 14 studies that form the dataset used in the meta-analysis presented in this section[16]. These studies report multiple coefficients varying from 1 to as many as 32 estimates and the reported impacts also vary widely. The multiple estimates reported by the studies creates problems for estimation. One way around this problem is estimating random effects

[16] Fourteen studies are adequate for a meta-analysis. Borenstein et al. (2009) points out that at least two studies are adequate for a fixed effect meta-analysis—for random effect meta-analysis two studies would be inadequate given its assumptions. Essentially, two studies in the fixed effects case can provide a more precise estimate of the true effect rather than a single study (Borenstein et al., 2009)—the main reason being that, the fixed effect model ignores dispersion in the study effects while the random effects model incorporates the dispersion in estimation (Borenstein et al., 2009). However, for the meta-regression analysis, fourteen studies seem to be fewer than most of the applications in the economics literature. The number of studies available depends on the topic and how many researchers are engaged in discussing that particular topic of interest.

and fixed effect models[17] to control for the within and between variation (Cipollina and Salvatici, 2010a). The fixed effects model uses the within variation while the random effects model uses a combination of the between and within study variation. This is useful in reducing the impact of the resulting heterogeneity as a result of pooling various estimates. There are other approaches to get around this problem, such as multilevel modelling—estimated study effects are assumed to be hierarchically ordered and nested within individual studies (for example, Konstantopoulos, 2011). These are explored in the analysis presented here.

One of the objectives of this section, is to summarise the AGOA impact reported in the selected studies. We investigate publication bias to see if the effect is as large as reported in a couple of studies (for instance, Collier and Venables, 2007; Nouve and Staatz, 2003). Moreover, we are also interested in whether there is a genuine or authentic effect based on the studies selected. Additionally, does the impact depend on the composition of countries? That is, are the studies that focus on only AGOA beneficiaries, the ones reporting larger coefficients compared to studies incorporating other non AGOA countries. Finally, a number of studies on AGOA have underscored the importance of apparel and textiles and reported strong impacts for AGOA beneficiaries. Using study specific variables we test whether the impact varies across product groups.

The rest of this section of the chapter, is organised as follows. Section (2.5.1) introduces the data, methodology and estimation framework used in the meta-analysis. Section (2.5.2) presents a visual guide to identifying publication bias as well as some stylised facts of the data. The next section (section 2.5.3) discusses the results while the final section (section 2.5.4), concludes the meta analysis section of this chapter.

2.5.1 Data and methodology

Search strategy

To build the database for the meta-analysis, a search was carried out at various periods between January and June 2011 and again in September 2012. The search strategy involved querying the Google search engine, Munich Personal REPEC Archive (MPRA), Google Scholar, ECONLIT, SCOPUS, Wiley Journals, World Bank's JOLIS, Web of Knowledge and JSTOR databases. The following key words "AGOA trade agreement", "economic impact of agoa trade preferences ", "African growth and opportunity act" and "AGOA trade preferences" were used in finding the studies for the meta analysis. A couple of studies were also obtained from the references of the selected studies. The search led to 30 studies, however these were reduced to fourteen studies. Three reasons for this include: (a) some studies were working paper versions of the published studies (all eight published papers for example), (b) some studies had been published under two or more titles but contained the same results (examples include, Collier and Venables, 2007; Frazer and Van Biesebroeck, 2010; Nouve and Staatz, 2003; Tadesse and Fayissa, 2008), and (c) some studies even though were an analysis of AGOA either did not include regression analysis or looked at other aspects of AGOA. For example, Olarreaga and Özden (2005) focussed on estimating the

[17]The use of the term random effects and fixed effects in this section is not similar to its usage in panel data analysis. The random and fixed effects here refers to the distribution of the population effect sizes. The random effects takes these as normally distributed while the fixed effects assumes them to be fixed. See the meta-analysis studies cited in section (2.5.1) for more examples of its usage in meta-analysis.

tariff rents in AGOA apparel and textile exports and Edwards and Lawrence (2010) were interested in the impact on prices. On the contrary, Brenton and Hoppe (2006); Lall (2005); Mattoo et al. (2003) and Páez et al. (2010) were not econometric studies. This leaves us with a sample of fourteen studies consisting of 179 study effects. Of the fourteen, eight were published in journals with the remaining six existing as working papers.

Funnel and Galbraith plots

In investigating publication bias several authors have suggested the inspection of funnel graphs which plot the inverse of the standard error against the effect size (partial correlation or coefficient) (Borenstein et al., 2009; Stanley et al., 2008; Stanley and Doucouliagos, 2010; Stanley, 2005, 2008; Sterne et al., 2001). There have been modifications and some studies show other types of funnel graphs. There is also the Galbraith plot which shows the relationship between the t-statistic and the inverse of the standard error. When these graphs show symmetry then it implies the absence of publication bias. However, when there are more points to one side of the mean effect (or zero) then it is an indication of publication bias (Borenstein et al., 2009; Sterne et al., 2001). Borenstein et al. (2009); Stanley et al. (2008); Stanley (2005, 2008); Sterne et al. (2001) have emphasised the need to carry out formal testing of publication bias since the visual inspection of the graphs can be subjective. The formal testing is discussed in the MRA models below.

Meta-Analysis: Fixed effect vs. random effects models

Two major approaches exist for summarising the study effects reported in each study to obtain a pooled estimate. The *random effect models (REM)* and *fixed effect models (FEM)* are the main approaches[18]. The FEM assumes all studies have the same effect size (μ) and that any departure from the observed effect are purely due to random errors (e_i) (Borenstein et al., 2009). On the contrary, the REM assumes that the effect size varies across studies and are randomly distributed within each study (Borenstein et al., 2009). The pooled estimates provided by these models are simply the weighted means of the observed study effects (in our case, the weighted means of the reported coefficients) (Borenstein et al., 2009). In the FEM model, the summary effect is given by a weighted average of the study effect sizes and the weights are the inverse of the variance of the coefficients reported in each study (Equations (2.4) – (2.6)).

The weights calculated in the FEM model penalises smaller studies while giving more weight to larger studies (Borenstein et al., 2009). The REM on the other hand, does not penalise smaller studies and incorporates all studies without having any particular study strongly influencing the summary estimate (Borenstein et al., 2009). Equations (2.6) – (2.10) represent the REM. The REM uses a moments based estimator in calculating the weights for θ^{REM} this is known as the DerSimonian and Laird method (Borenstein et al., 2009). The Q statistic calculated in equation (2.9) can also be taken as a test for the presence of homogeneity between studies. The test statistic is distributed as χ^2 with $k-1$ degrees of freedom (df) (Borenstein et al., 2009; Feld and Heckemeyer, 2011).

[18]See footnote (17) for a distinction between the REM and FEM models from their usual usage in panel data econometrics.

$$\theta^{\text{FEM}} = \mu + e_i \tag{2.4}$$

$$\theta^{\text{FEM}} = \frac{\sum_{i=1}^{k} W_i b_i}{\sum_{i=1}^{k} W_i} \tag{2.5}$$

$$W_i = \frac{1}{V_{b_i}}$$

$$\theta^{\text{REM}} = \mu_i + e_i \tag{2.6}$$

$$\theta^{\text{REM}} = \frac{\sum_{i=1}^{k} W_i^{REM} b_i}{\sum_{i=1}^{k} W_i^{REM}} \tag{2.7}$$

$$W_i^{\text{REM}} = \frac{1}{V_{b_i}^{\text{REM}}} \; ; \; V_{b_i}^{\text{REM}} = V_{b_i} + T^2$$

$$T^2 = \frac{Q - df}{C} \tag{2.8}$$

$$Q = \sum_{i=1}^{k} b_i^2 - \frac{\left(\sum_{i=1}^{k} W_i b_i\right)^2}{\sum_{i=1}^{k} W_i} \tag{2.9}$$

$$C = \sum_{i=1}^{k} W_i - \frac{\sum_{i=1}^{k} W_i^2}{\sum_{i=1}^{k} W_i} \tag{2.10}$$

Where, V_{b_i} is the variance of b_i, W_i are the weights assigned to each study, b_i are the observed effect size in the studies selected, and θ^{FEM}, θ^{REM} are the FEM and REM pooled estimates of the various effect sizes respectively, $df = k - 1$ and k is the number of studies. The variances of the pooled estimates are $V_\theta^{\text{FEM}} = 1/\sum_{i=1}^{k} W_i$ and $V_\theta^{\text{REM}} = 1/\sum_{i=1}^{k} W_i^{\text{REM}}$ respectively. C is a scaling factor and T^2 is the between studies variance. The standard error is then the square root of the variance. The confidence intervals for both models are then given by CI $= \theta + 1.96 \times \sqrt{V_\theta}$. The weights for the REM are differentiated by the superscript REM.

There is consensus in the literature that the REM is a preferred estimator when coefficient estimates are heterogeneous. The FEM performs poorly in the presence of heterogeneity. However, in the absence of heterogeneity the FEM can be used to obtain unbiased estimates of the summary study effect (Borenstein et al., 2009). Furthermore, Borenstein et al. (2009) points out that the FEM can be performed on two or more studies unlike the REM which requires a decent sample size. In the presence of heterogeneity, it is useful to investigate the sources of the heterogeneity. In this paper, we pursue this by estimating our REM model by study as well as using an MRA to investigate the sources of heterogeneity. We are able to carry out tests of heterogeneity using the I^2 statistic ($I^2 = (Q - df/Q) \times 100$). This allows us to decide on the type of modelling to carry out. Borenstein et al. (2009) citing Higgins et al (2003) suggest that values of 25%, 50% and 75% can be considered as low, medium and high heterogeneity respectively. An I^2 value of 0% implies that there is no real variation in the studies while a value of 100% indicates high heterogeneity and real variation among coefficients reported by the individual studies.

Borenstein et al. (2009) note that one of the aims of a meta-analysis is to include several studies that are not necessarily similar—thus, allowing one to study the observed patterns in the selected studies. They also point out that in a meta-analysis it is possible to combine different study designs (in our case an example can be found in the differences in the regression models, that is, time series or cross-section or panel data regressions among others) and studies reporting results in different ways. From our summary of the studies in table (2.1) above we find differences in study designs and sample sizes of the studies. Following Borenstein et al.'s (2009) advice it is possible to combine all these studies—since our interest is on the reported impact of AGOA. A summary of this view found in Borenstein et al. (2009) is quoted below.

> In most meta-analyses, however, the inclusion criteria will be broader than this. It is an important feature of a meta-analysis that it may (usually must) address a broader question than those addressed by the primary studies it includes. Thus a certain amount of diversity among the studies is not only inevitable but also desirable. A good meta-analysis will anticipate this diversity and will interpret the findings with attention to the dispersion of results across studies (Borenstein et al., 2009, 358).

Meta-regression model

In carrying out the MRA, we need to emphasise that, in the presence of several coefficients a careful choice of MRA to apply is required. Questions of which coefficient to choose to represent each study becomes difficult to answer. Secondly, the presence of more than one coefficient per study also poses problems. Some authors get around this problem by selecting particular estimates or using the mean, mode or other moments of the study effects. In this paper, we choose to include all estimates and thus, pursue a multi-level MRA to account for the multiple coefficients per study to check the accuracy of the pooled MRAs. The MRA takes the following form

$$\frac{b_{ij}}{Se_{ij}} \equiv t_{ij} = \beta_0 + \beta_1 \left(\frac{1}{Se_{ij}} \right) + \nu \tag{2.11}$$

$$t_{ij} = \beta_0 + \beta_1 \left(\frac{1}{Se_{ij}} \right) + \sum_{k=1}^{K} \frac{\gamma_k Z_{ijk}}{Se_{ij}} + \nu \tag{2.12}$$

$$t_{ij} = \alpha_0 + \alpha_1 \left(\frac{1}{Se_{ij}} \right) + \sum_{k=1}^{K} \frac{\zeta_k Z_{jk}}{Se_{ij}} + \mu_{0j} + e_{ij} \tag{2.13}$$

$$var(e_{ij}) = \sigma_e^2 \ ; \ var(\mu_{0j}) = \sigma_{\mu 0}^2 \ ; \ e_{ij} \sim iid(0, \sigma_e^2); \ \mu_{0j} \sim iid(0, \sigma_{\mu_0}^2)$$

Where b_{ij} is the i^{th} coefficient from the j^{th} study, t_{ij} is the reported t-statistic of the i^{th} estimate in the j^{th} study, Se_{ij} is the reported standard error, Z_{ijk} measures characteristics in each study—those that explain the differences between studies as well as certain features of each particular study, ν is the disturbance term, μ_{0j} is a study level random intercept and e_{ij} is the error term.

Equations (2.11) and (2.12) will be estimated by WLS while Equation (2.13) is a multi-level equation with studies at level 2 and coefficient estimates at level 1. For Equation (2.13), α_0 is assumed to be the same for each study. The study level component (μ_{0j}) represents the departure of the j^{th} study's intercept from the overall population intercept (α_0). The first two coefficients are the fixed part of the model and the last two terms provide us with the random variation (Goldstein, 1998). The variance partition component (VPC) can be calculated as

$$VPC = \frac{\hat{\sigma^2_{\mu 0}}}{\hat{\sigma^2_e} + \hat{\sigma^2_{\mu 0}}}$$

This indicates the percentage of the variance that can be attributed to differences between studies.

Meta-significance testing

Stanley (2005, 2008) note that a logarithmic relationship exists between the t-statistic and the degress of freedom. A positive relationship between the two provides a confirmation of the empirical effect (Stanley, 2005, 2008). A variation of Equation (2.11) is to use the natural log of the reported degrees of freedom in each study, that is

$$\ln |t_{ij}| = \delta_0 + \delta_1 \ln(df_{ij})$$

Other versions also employ either the square root of the degrees of freedom ($\sqrt{df}$) or the natural log of the sample size ($\ln N$) in place of $\ln(df)$ (examples of empirical work in this area include, Doucouliagos, 2005; Doucouliagos and Stanley, 2009; Rose and Stanley, 2005; Stanley et al., 2008; Stanley, 2005, 2008). This is the *meta-significance testing (MST)* approach and is explored in the present analysis to ensure the robustness of our results. In the MST, $\delta_1 \neq 0$ indicates the presence of a genuine effect. Stanley (2005, 2008) note that an effect exists when $\delta_1 = 1/2$. In the log-linearised model shown above rejecting $\delta_1 \leq 0$ indicates the existence of an empirical effect (Stanley et al., 2008; Stanley, 2005). According to Stanley (2005) the estimates in the MST regression can be affected by publication selection. However, publication bias is proportional to the inverse of the square root of the sample size ($\sqrt{n}$) in the presence of publication selection (Stanley, 2005). Publication selection therefore reduces the positive coefficient on the log of degrees of freedom thereby resulting in a coefficient that is less than half (Stanley, 2005).

Yet another way of testing for a genuine empirical effect is to shrink the coefficients to zero by correcting for publication bias (Stanley, 2005). Then a regression of the corrected t-statistics on precision should yield an answer to whether there is any genuine empirical effect.

$$|t_{ij}| = \varphi_0 + \varphi_1 \left(\frac{1}{Se_{ij}}\right) + \xi$$

$$\text{corrected} - t_{ij} = \phi \left(\frac{1}{Se_{ij}}\right) + \varepsilon$$

In MST, the alternate hypothesis (H_1) $\delta_1 > 0$ implies a genuine empirical effect. Similarly, $\varphi > 0$ and $\phi \neq 0$ indicates publication bias and a genuine empirical effect respectively. In the joint PET/MST $\beta_1 \neq 0$ (in Equation [2.11] – [2.12] and $\alpha_1 \neq 0$ in Equation [2.13]) and $\delta_1 > 0$ indicates a genuine empirical effect (Stanley, 2005).

Finally, following Stanley (2005) and Stanley et al. (2008) we carry out a t-test of β_0 in Equation (2.11) and (2.12) to test for publication bias (*funnel asymetry test (FAT)*) and a test of $\beta_1 = 0$ which provides the *precision-effect test (PET)*. This is similarly done for α_0 and α_1 to test for FAT and PET respectively. Stanley (2005) also notes that a useful strategy is to carry out joint PET/MST testing to identify genuine effects in the presence of publication bias. This is also carried out in the results section. Controls included in Equation (2.12) and (2.13) allow us to check whether the reported estimates in the studies are strongly influenced by study characteristics.

2.5.2 Stylised facts about the AGOA studies included

In the meta-analysis literature, the distribution of points on the funnel plot must be symmetric for a researcher to have confidence that there is no publication bias. A non-symmetric diagram indicates that publication bias is present in the sample of studies being analysed. The symmetry indicates that the plausible range of values for the coefficients are present within the body of studies on the subject. In other words, one expects to find estimates that vary randomly around the true effect (Stanley, 2005). Thus as noted by Stanley (2005), publication bias or selection leads to statistically significant results being published thereby skewing the distribution of coefficient estimates.

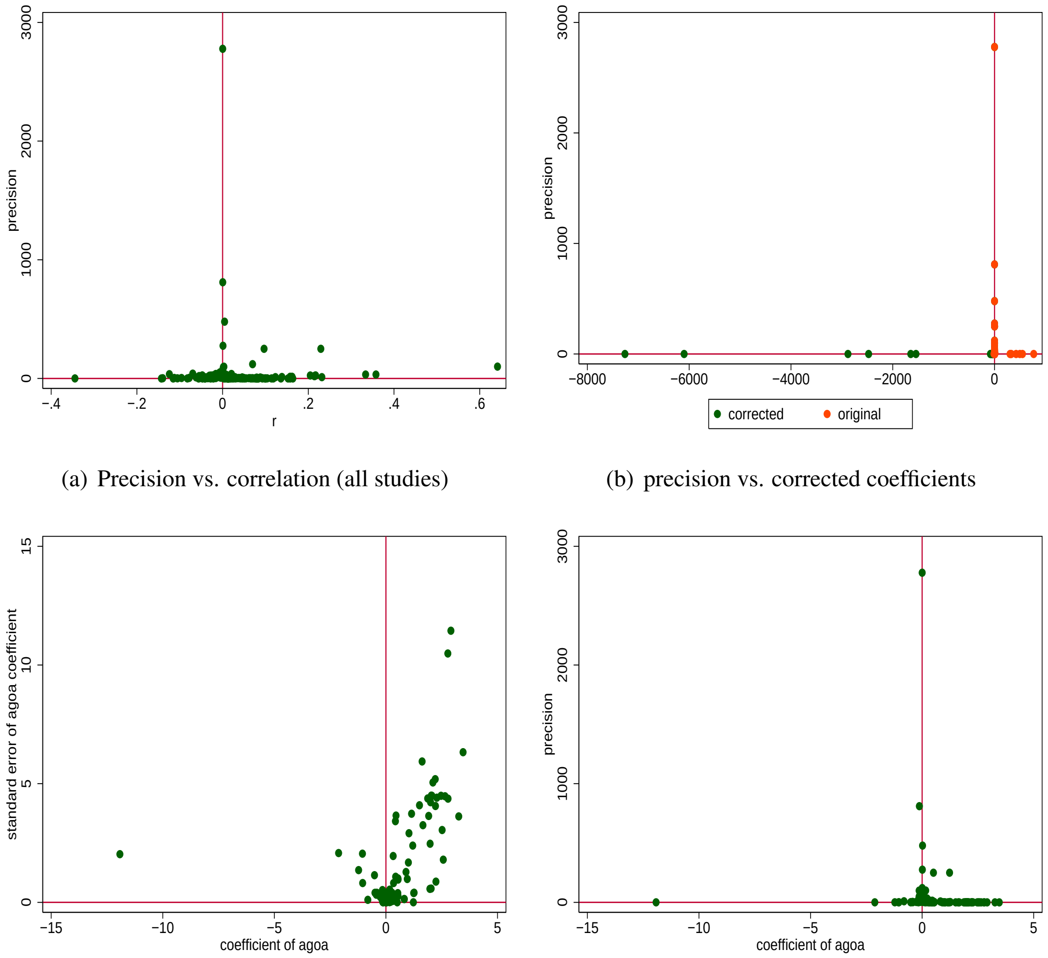
Figures (2.3) – (2.5) show various features of the underlying data for the meta analysis. Figure (2.3) and (2.4) show various funnel plots to provide a visual aid in identifying any publication bias present in the meta analysis. Panel (2.3(a)) plots the precision of the estimated AGOA effect against a partial correlation of the AGOA coefficient (all studies are included). However, the remaining three panels exclude six large estimated coefficients reported in one of the studies. These coefficients are larger than 300 while the remaining coefficients used in the plots are less than four, hence their exclusion in this case. Panel (2.3(b)) shows a funnel plot with the missing estimates to the left of the mean included. Figure (2.3) and (2.4) indicate that publication bias is plausible. There are more positive effects than negative effects as shown by the vertical line at the mean of zero. Borenstein et al. (2009) note that the interpretation of the funnel plot can be subjective and there is the need for other tests to be carried out (also, Stanley et al., 2008; Stanley, 2005, 2008).

Following Stanley (2005, 2008) and Stanley et al. (2008) we carry out formal tests of publication bias in addition to the funnel plots shown in this section. Figure (2.5) plots the coefficients (and T-stats) reported against the number of post-AGOA years of data available as well as the period of time post AGOA when the paper was written. A quadratic fit is added in each panel. The figures indicate a slight U-shaped relationship. In the initial years after AGOA, large coefficients and highly significant results were reported. However, this tended to reduce till six years after AGOA when larger and more significant coefficients were reported again. Thus, with the passage of time smaller coefficients and larger t-statistics are reported. This is similar to the findings of Stanley et al. (2008) for the relationship between t-statistics and unemployment. Although, they show an inverted-U shaped quadratic fit[19] they also find larger absolute t-statistics reported with the passage of time.

In summary, the funnel plots indicate that there is some publication selection occurring. Studies are more likely to report positive coefficients rather than negative coefficients. These coefficients are also more likely to be further from zero. This selection of positive coefficients therefore raises the impact of AGOA beyond its true value. Hypothetically, if we were to have a true impact of zero, then the funnel plots should show the points being random around the zero impact. Having more coefficients on the positive side of the true impact of zero (in this case) then leads to an

[19]Their t-statistics are all negative compared to ours that are mostly positive. Thus considering absolute values we both display a similar trend. To establish this result further, we would require more annual data on published studies post-AGOA

overstatement of the impact. Similarly, it is possible to have a lot more studies reporting a negative impact in which case it would still be publication selection. This overstatement of the empirical results generally biases the magnitude of reported coefficients upward (Stanley, 2005). This makes the funnel plot *a priori* point publication bias towards one direction—thereby assuming that publication selection is unidirectional (Stanley, 2005).



(a) Precision vs. correlation (all studies)

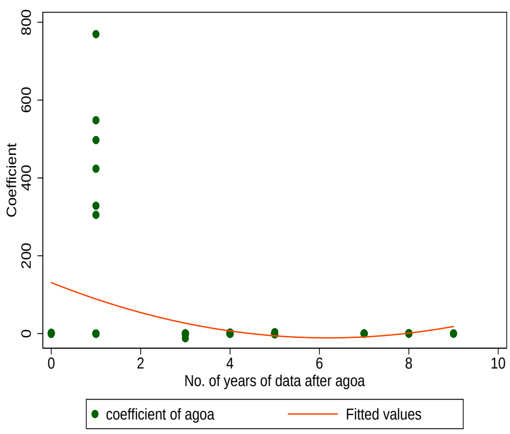
(b) precision vs. corrected coefficients

(c) Standard error vs. coefficient (excluding 6 large values)

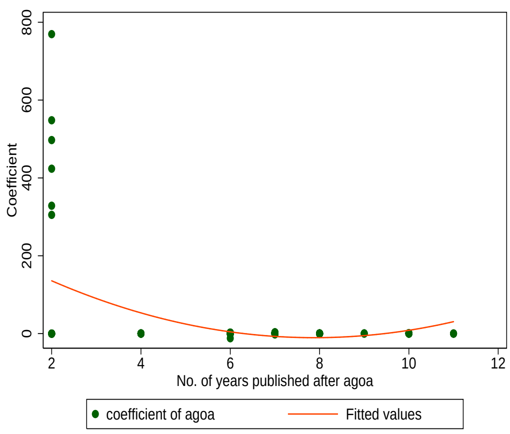
(d) Precision vs. coefficient (excluding 6 large values

Figure 2.3: Funnel plots of agoa impact

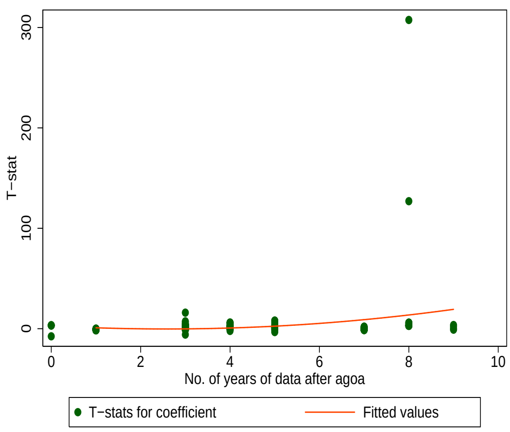
Figure 2.4: Standard error vs. coefficient based on Egger et al. (1997) methodology



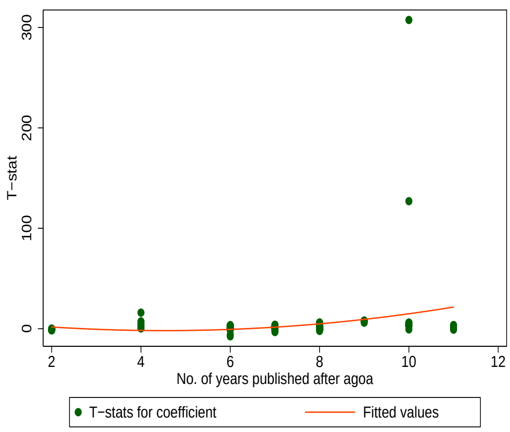
(a) coefficient vs. no. of years of data post agoa



(b) cofficient vs. no. of years published post agoa



(c) t-statistics vs. no. of years of data post agoa



(d) t-statistics vs. no. of years published post agoa

Figure 2.5: Relationship between years after agoa and coefficient/T-stat

2.5.3 Results

The results of the meta-analysis and meta-regression are presented in the following sections. Three main estimations are carried out in the text. Table (2.2) reports the results of the meta significance tests in five columns. Tables (2.3 & 2.4) present the random effects and fixed effects meta regression results. However, the results of the weighted least squares (ie. the fixed effects meta regression) is likely to be biased given the presence of the high level of heterogeneity in the study effects. We include the results here, in comparison to the other results shown. The final table (table 2.5) provides the estimates for the multilevel meta regression. In two studies (Nouve and Staatz, 2003; Seyoum, 2007) probability values were reported instead of t-statistics or standard errors. Hence, the inverse of the t-distribution was used to recover the t-statistics—the distribution of these imputed statistics are presented with the summary statistics reported in Table (A.1) in appendix (A).

Random effects meta-analysis

The summary statistics and the studies used in the meta analysis are presented in appendix (A) (Tables A.1 – A.2). The results of the random effects meta analysis are presented below. Figure (2.6) shows the meta-analysis by whether the studies were published or not. Figure (2.7) presents a visual representation of the summary meta analysis by study. The length of the diamonds in the graph represent the confidence intervals of the pooled study effects of each study. Three studies have a negative pooled estimate (Cooke, 2009; Nouve and Staatz, 2003; Seyoum, 2007). Of the three studies only Nouve and Staatz (2003) reports a significant pooled estimate. The remaining pooled coefficients are positive and three of these are significant. The graphs present the tests of heterogeneity (I^2) after each estimated effect. Five of the studies display high levels of heterogeneity reporting I^2 values of 69.7% – 99.9%. Five out of the remaining six studies have an I^2 value of zero indicating that there is no real variation among their coefficients. The pooled estimate of all studies of 0.12 is significant and also displays high heterogeneity ($I^2 = 99.9\%$). Thus, the pooled AGOA impact is 12.8% ($[\exp(0.12) - 1] \times 100$). This estimate provides us information about how large the impact should be and also whether it is positive or negative. The reported estimate is thus, the combined estimate calculated based on pooling the study effects obtained from the selected studies.

In terms of figure (2.6), the published studies report a pooled effect of 0.01 which is relatively smaller than the 0.16 pooled study effect reported for unpublished studies. Again, a large amount of heterogeneity is present justifying our use of the random effect meta-analysis model. The I^2 is significant at 1% and reports values of 99.9% for unpublished studies and 72.9% for published studies. Due to the heterogeneity present in the studies (Figures [2.6–2.7]), pooled estimates from the FEM would be biased and hence its results are not reported in the appendix. However, for comparative purposes the estimate of the FEM was 0.007 (0.7%) which is much less than the 12.8% estimate reported by the REM[20].

[20] The exclusion of studies with coefficients above 50 and also excluding studies with only one coefficient did not change the pooled estimate. The pooled estimate stays at 0.12. On the other hand excluding studies with a single coefficient does reduce the confidence interval by a unit.

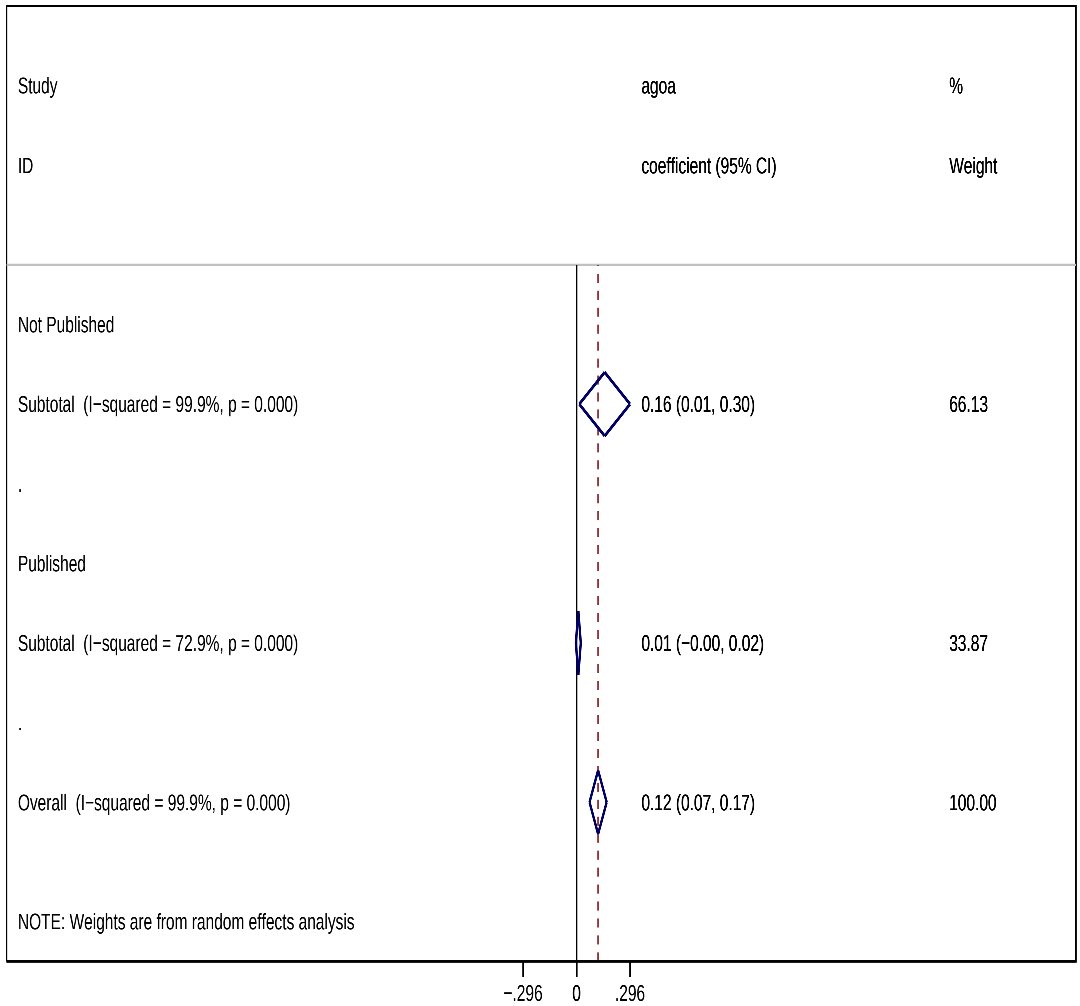


Figure 2.6: Random effects meta-analysis by publication status

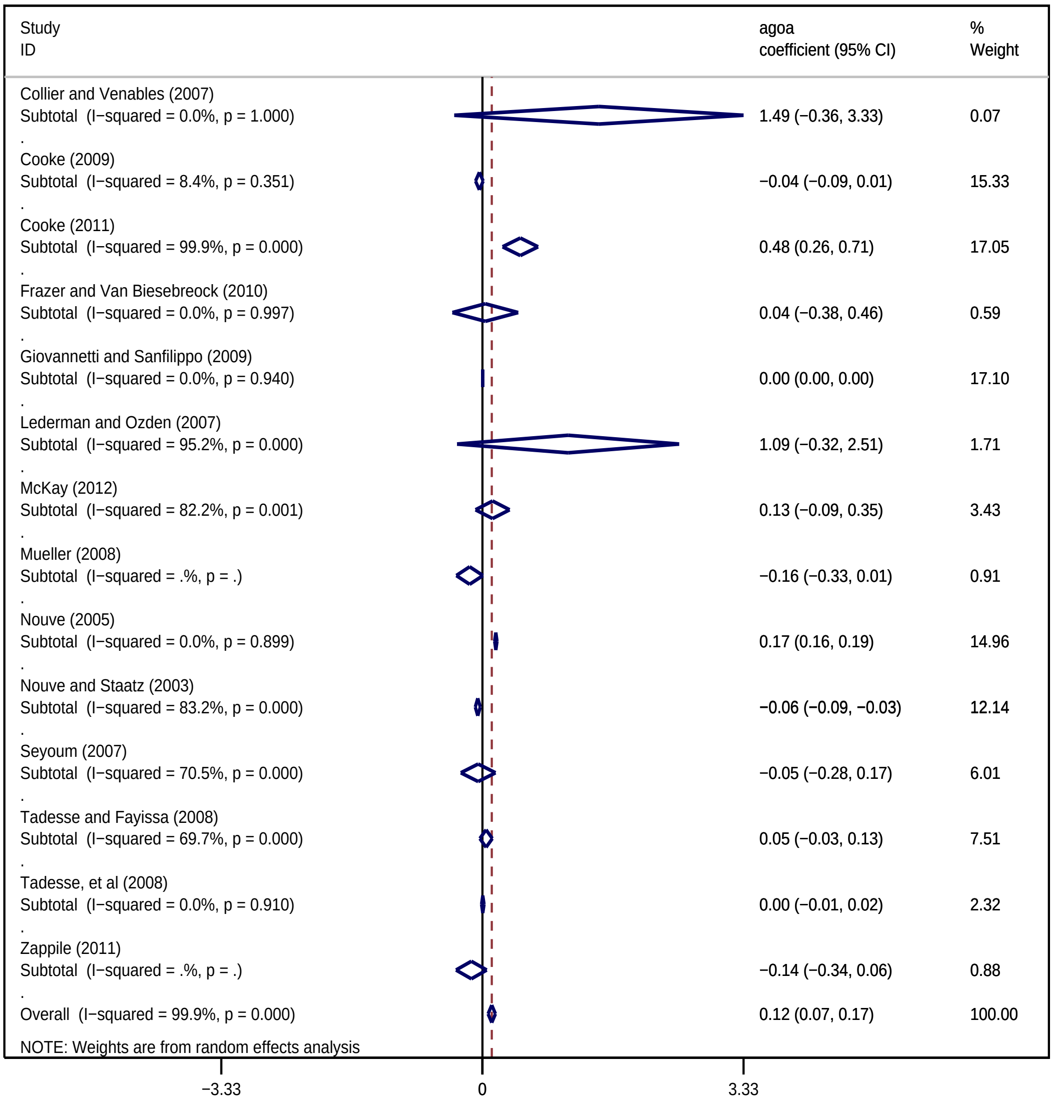


Figure 2.7: Random effects meta-analysis by study

Meta-significance tests

We present the MST results (tests of genuine empirical effect) in Table (2.2). Results in columns (1), (3) and (4) point to the presence of a genuine empirical effect. The regressors—the log of degrees of freedom, sample size and square root of degrees of freedom are all significant at the 1% level of significance in each of the three columns respectively. However, columns (2) and (5) find no effects. The square root of degrees of freedom and precision are insignificant also in the remaining columns. In column (5) we followed Stanley (2008) by shrinking the t-statistic value to zero and using it as the dependent variable. All three estimates of the genuine effect are greater than zero and less than half in columns (1) and (3) of the table. A t-test of $\alpha_1 = 1/2$ is rejected in all three cases (with t values of 12.41, 12.40 and 23.02 respectively) with the result—$\alpha_1 < 1/2$.

The significant coefficients exhibited in columns (1, 3 & 4) indicate the presence of a genuine empirical effect in the studies of AGOA. This is the effect after controlling for publication selection. Thus, our sample does show a positive impact of AGOA for the African beneficiaries. The rest of this chapter continues by testing other variants of the MRA model to reach a robust conclusion on publication bias and genuine empirical effects. Last but not the least, the remaining models estimated allow us to incorporate moderator variables to control for any heterogeneity that might be present among the studies. This way, we control for any characteristics that might be explaining the differences in the study effects.

Table 2.2: MST—Test of Authentic effect

	(1) log of T-stat	(2) T-stat	(3) log of T-stat	(4) log of T-stat	(5) Corrected T-stat
log of degrees of freedom	0.242^{*}				
	(0.109)				
degrees of freedom (square root)		0.015		0.001^{**}	
		(0.011)		(0.000)	
N (in logs)			0.241^{*}		
			(0.108)		
precision					-0.010
					(0.013)
Constant	-1.578	-21.505	-1.596	0.481	-0.000
	(1.609)	(22.151)	(1.605)	(0.681)	(0.441)
Study dummies	Yes	Yes	Yes	Yes	Yes
Observations	178	179	178	178	179
R^2	0.425	0.113	0.424	0.433	0.100

Robust standard errors in parentheses, dependent variable is absolute value of T-statistics
$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Meta-regression analysis: random and fixed effects weighted least squares

In Table (2.3), our initial FAT/PET results are presented using a random effects model. Precision is insignificant in the first two columns of the table, indicating the absence of a genuine effect. However, in the third column, a significant and negative coefficient is reported. The constant (β_0) in Equation (2.11) is not significant in any of the columns indicating the absence of publication bias. This result contradicts the evidence presented in the funnel plots of the previous section that shows a large publication bias. The inconsistency of the funnel plots and the MST results above might be due to the nesting of several coefficients per study. This multiplicity of study effects might be driving the results indicating the absence of publication bias. Further analysis to investigate the publication bias and the evidence of a genuine effect are presented in the remaining sections to enable us reach a more definitive conclusion on the presence (or absence) of publication bias and genuine effects.

The presence of product effects, single country studies, logged dependent variables, OLS/time series analysis, number of explanatory variables and the use of annual data exerts a positive effect on the reported t-statistics (study effects) in table (2.3). Given that the studies vary largely on these dimensions, we find that they provide a plausible explanation for the wide variation in the estimated coefficients reported in the sample of studies. Additionally, these contribute to the variation in the reported t-statistics. Apart from raising the significance level of the estimates, the remaining significant regressors in our model tend to reduce the reported t-statistics in the study sample. The number of years, country effects, cross-section data and gravity regressions are the main study characteristics having a negative effect on the reported t-statistics. Similarly, the results in this section are showing the absence of publication bias. The constant in all three columns remain statistically insignificant. The coefficient on precision ($1/SE_i$) is not significant in the first two columns but significant in the last column. In the last column of the table, the coefficient of -0.393 indicates that there is a genuine empirical effect that is negative. The inclusion of moderator variables in columns (2 & 3) are to explain away any heterogeneity that is present in the studies. Thus, the results provide no conclusive evidence on a genuine empirical effect. It is difficult but not impossible to explain the sign on the precision coefficient which is inconsistent with the earlier empirical effects reported in the previous section. One explanation we offer here, might be the use of the random effects[21] meta-regression which has allowed the underlying study effects to vary.

Table 2.3: Random effects metaregression results

	(1) T-stat	(2) T-stat	(3) T-stat
precision ($1/SE_i$)	0.00596	0.515	-0.393*
	(0.009)	(11.266)	(0.184)
no. of explanatory variables		0.0424***	0.0422***
		(0.001)	(0.001)
N (in logs)		0.000881	-0.00687
		(0.042)	(0.008)
no. of years (logs)		-0.341	-0.360***
		(1.019)	(0.103)
no. of countries (logs)		-0.0195	-0.00540
		(0.053)	(0.022)
published = 1		-0.0256	0.0115
		(0.045)	(0.014)
country effects = 1		0.223	-0.250**
		(1.131)	(0.091)
time effects = 1		-0.00332	0.00488
		(0.141)	(0.071)
cross section = 1		-5.135	-3.320***
		(16.813)	(0.296)
other preferences included = 1		0.864	0.0547
		(5.826)	(0.078)
gravity regression = 1		0.646	-0.351**
		(5.477)	(0.107)
robust s.e. = 1		0.00754	0.0491
		(0.064)	(0.033)
product effects = 1		0.533	0.438***
		(0.598)	(0.103)
single country analysis		-0.666	1.153***
		(5.734)	(0.162)
logged dep. var. = 1		0.526	0.367***
		(1.029)	(0.093)
Agriculture		-0.00756	
		(0.026)	
All/Total		0.599	
		(1.217)	
Apparel/Textiles/Leather		0.0409	
		(0.190)	

[21] See footnote 17

Energy/Electricity/Chemicals		0.0369	
		(0.037)	
Region = AGOA countries		-0.312	
		(0.587)	
Dependent var. = Exports		-1.827	
		(10.780)	
Dependent var. = Imports		0.103	
		(5.421)	
time frequency = Annual		-0.607	
		(5.735)	
GMM/IV		1.103	
		(0.775)	
OLS/Time series		0.501^{*}	
		(0.252)	
Level of disaggregation = 6 digit and above		-0.953	
		(5.802)	
Level of disaggregation = below 6 digits		-0.711	
		(5.427)	
Level of disaggregation = Sector totals		0.554	
		(1.209)	
annual = 1			1.055^{***}
			(0.173)
Constant	0.130	-0.0283	-0.125
	(13.141)	(3.409)	(1.295)
Study dummies	Yes	Yes	Yes
Observations	179	179	179
$\tau^2 = 0$ —constant only model	705.4	6543.3	705.4
τ^2 estimate	683.6	8.381	2.384
LR test of $\tau^2 = 0$	1.25387e+09		232187.1
degrees of freedom	164	139	149

Standard errors in parentheses. All explanatory variables are divided by the standard error of the reported coefficients in the studies. The hypothesis τ^2 tests whether a fixed effects model is appropriate for the analysis. The constant only test uses a version of the heterogeneity test (Q–test) while the LR test is based on a residual maximum likelihood model. In all three models the fixed effects model is rejected due to the presence of heterogeneity. Estimates based on the *metareg* command of Roger Harbord.
$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The previous table (table 2.2) is based on the fixed effects meta-regression model and hence, assumes the study effects to be constant. Table (2.4) which incorporates the fixed effects assumption is consistent with the earlier table. It provides positive but larger genuine effects with the exception of two negative genuine effects in columns (5 & 6). We can however, rule out column (5) at the 5% level of significance. On the contrary the effect reported in column (5) is probably driven by the heterogeneity in the study effects. Let us not forget that, the square of the standard error is now used as weights. These two features, that is the heterogeneity present and different weights are probably contributing to the negative estimate of the genuine empirical effect. The next column which also uses the square of the standard error as weights reports a positive coefficient. This leads us to believe that, the heterogeneity of the effects rather strongly influenced the sign of the estimate in column (5).

Furthermore, table (2.4) indicates strongly the presence of publication bias in addition to the genuine empirical effects mentioned in the previous paragraph. Column (1 & 6) report the basic MRA of Equation (2.11). The remaining columns include moderator variables. The final two columns, however, use the variance (σ^2) of the reported coefficients as the weights. Apart from column (1 & 5) all the remaining columns indicate varying levels of publication bias. While columns (2, 3, & 7) are negative, columns (4 & 6) are positive. In all cases there is some positive publication selection occurring. In other words, large effects (negative or positive) are reported and published. Another implication is that, insignificant and smaller effects are not reported by authors or do not get published. But then again, these findings would hold if the assumptions of the fixed effects are upheld. A probable reason for the changes in the publication bias coefficient is the choice of moderator variables. Nonetheless, we are wary of the small number of studies that the analysis is based upon. These, can have an effect on the estimated coefficients. However, we are constrained by the number of AGOA impact studies that have been published or released as working papers. An increase in the number of studies would be useful in improving the estimates as well as providing more stable estimates of publication bias.

The number of covariates in a study is positive and significant at the 1% level in all four columns it appears in. The magnitude of the coefficient remains at 0.04 in all the four columns. The preference dummy (columns 3, 5 & 7), selection correction (3, 5 & 7), AGOA countries relative to all countries (4 & 5), gravity estimation relative to other methods (3 & 7), country fixed effects (3 & 7), number of observations (7) and cross-section data (7) are all significant at the 5% level and contribute to a decrease in the reported t-statistics, on average and all things equal. On the contrary, product fixed effects (7), other preferences (7), logged dependent variable (5 & 7), energy/electricity/chemical products (5 & 7), aggregated data (5), single country analyses (5 & 7), and published studies (7) are also significant at the 5% level but have a positive association with the reported t-statistics. All things equal, these variables lead to larger t-statistics reported by authors. Of the remaining coefficients, annual data relative to monthly data is positive and significant in column (5). A few of the significant coefficients are observed to reverse their signs as more moderator variables are included in the regression. An example is the coefficient of robust standard errors (this is negative in column 3 but positive in column 7). Finally, all regressors in column (7) are strongly significant. The following variables are shown to raise the study effect on average and *ceteris paribus*: logged dependent variables, robust standard errors, product fixed effects, single country analysis, agricultural products, inclusion of other preferences (or PTAs), published articles, annual data and the number of covariates. On the contrary, the number of years, the number of countries, accounting for selection, incorporating country effects, time effects, using cross-section data, gravity models and using a dummy to capture the AGOA preference reduces the study effect on average and *ceteris paribus*. Given the flaky nature of the results for the fixed effects and the inconclusive evidence from the random effect meta-regression earlier, we estimate a multilevel meta-regression in the next section as a further robustness check.

Table 2.4: Weighted Least Squares meta analysis results

	(1) T-stat	(2) T-stat	(3) T-stat	(4) T-stat	(5) T-stat	(6) T-stat	(7) T-stat
Constant	-0.0716	-0.507***	-0.319**	0.302**	0.155	1.513***	-0.358***
	(0.092)	(0.094)	(0.104)	(0.111)	(0.116)	(0.003)	(0.006)
no. of covariates		0.0416***	0.0416***	0.0418***	0.0419***		0.0425***
		(0.000)	(0.000)	(0.000)	(0.000)		(0.000)
No. of obs (log)		0.00362	-0.00160	0.00803	0.0104		-0.0161***
		(0.004)	(0.006)	(0.014)	(0.014)		(0.000)
No. of years used (log)		-0.147	-0.344	0.0870	-0.188		-0.231***
		(0.349)	(0.359)	(0.366)	(0.374)		(0.002)
No. of countries (log)		-0.0613***	-0.0525***	-0.0519***	-0.0570***		-0.0280***
		(0.009)	(0.010)	(0.014)	(0.014)		(0.000)
annual = 1			0.0287				0.881***
			(0.191)				(0.004)
selection = 1			-0.185***		0.275***		-0.252***
			(0.049)		(0.054)		(0.004)
published = 1			-0.741		-1.543		0.0117***
			(0.525)		(1.100)		(0.000)
country effects = 1			0.456*		0.498		-0.289***
			(0.201)		(0.499)		(0.004)
time effects = 1			0.0135		0.00465		-0.0314***
			(0.048)		(0.048)		(0.004)
cross section = 1			0		0		-2.274***
			(.)		(.)		(0.012)
other preferences included =1			-0.488		-0.0523		0.206***
			(0.415)		(0.747)		(0.001)
gravity regression = 1			-1.097*		-1.563		-0.287***
			(0.482)		(1.011)		(0.003)
preference dummy = 1			-2.340***		-2.028***		-2.706***
			(0.286)		(0.422)		(0.102)
robust s.e. =1			-0.144***		0.0232		0.00619***
			(0.017)		(0.019)		(0.001)
product effects =1			-0.247		-0.201		0.446***
			(0.182)		(0.499)		(0.003)
single country = 1			0		2.203*		0.928***
			(.)		(1.026)		(0.006)
logged dep. var. = 1			-0.118		2.181**		0.386***
			(0.182)		(0.697)		(0.003)
Agriculture				-0.00957	-0.0117		
				(0.008)	(0.008)		
All/Total				0.128	2.140**		
				(0.192)	(0.666)		
Apparel/Textiles/Leather				0.00559	0.0239		
				(0.060)	(0.060)		
Energy/Electricity/Chemicals				0.0262*	0.0247*		
				(0.012)	(0.012)		
Region = AGOA countries				-0.300*	-0.538**		
				(0.151)	(0.166)		
Dependent var. = Exports				0.133	1.280		
				(2.201)	(0.888)		
Dependent var. = Imports				-0.178	-1.825		
				(1.579)	(1.747)		
time frequency = Annual				-0.0566	2.347*		
				(0.193)	(1.015)		
GMM/IV				-0.430*	-0.899+		
				(0.191)	(0.538)		
OLS/Time series				-0.587***	-0.669***		
				(0.028)	(0.035)		
Level of disaggregation = 6 digit and above				0.278	2.415*		
				(2.132)	(1.052)		
Level of disaggregation = below 6 digits				-0.281	1.438		
				(1.483)	(1.630)		
Level of disaggregation = Sector totals				0.132	2.138**		
				(0.203)	(0.668)		
Precision ($1/SE_i$)	0.0553	0.677	4.073**	0.0758	-2.524+	-0.298***	2.262***
	(0.216)	(0.804)	(1.340)	(2.377)	(1.340)	(0.047)	(0.102)
Study dummies	Yes	Yes	Yes	Yes	Yes	Yes	No
Observations	179	179	179	179	179	179	179
goodness of fit–χ^2	17061.2	1091.6	858.3	565.2	431.6	1.01861e+09	319587.7
model χ^2	104676.7	120646.2	120879.6	121172.6	121306.3	8.28448e+09	1.37106e+10

Standard errors in parentheses. All explanatory variables divided by standard error. The last two columns use the square of the standard error as weights. $^{+}\ p < 0.1$, $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Multi-level meta-regression

The final table, Table (2.5) below presents the multi-level MRA estimates. We include these results to check the robustness of our earlier random effects MRA results—given that that our coefficients are nested in the individual studies. The intercept is the only random component included in the 2-level multi-level MRA below. In columns (2 & 3) in the table, precision is negative and significant at the 1% level of significance. The number of covariates and the presence of product effects are robust to the inclusion of additional moderator variables. Nonetheless, the number of covariates is robust across all three tables—the coefficients are also quite similar (approximately 0.04). The number of covariates, presence of products effects, use of a logged dependent variable, annual data, single country analysis, energy/electricity/chemical products, GMM/IV and OLS/time series estimators (relative to other estimation methods) tend to significantly increase the study effects, on average and *ceteris paribus*. On the contrary, gravity models, cross section data and the number of years significantly reduce the reported study effect, on average and *ceteris paribus*. The significance of these variables indicate that much of the variation in reported study effects is explained by the differences in these study characteristics. Thus, these variables are the main characteristics behind the differences in reported study effects. Nonetheless, a number of these variables are significant across all three tables with similar signs and impact on the t-statistics reported in the studies.

All the variables in the preceding are significant at 1% with the exception of the published study coefficient that is significant at the 10% level of significance. The random component of the model ($\ln \sigma_u$) and the residual standard error ($\ln \sigma_e$) are significant in all three columns. These indicate that the studies are largely different from each other. The variance partition component (VPC) corroborates this evidence together with the I^2 tests discussed earlier which all point to the heterogeneity of the studies. The VPC calculated are 5.7%, 17.8%, 80.8% and 17.8% for columns (1) – (4) respectively. They indicate the level of variance in study level t-statistics that can be attributed to differences between the various studies in the sample. In column (3), the VPC is large and implies that, 80.8% of the variance is due to differences between the studies. On the other hand, the basic MRA in column (1) attributes only 5.7% of the variance to differences between the studies. Thus one observation from the table, is that increasing the moderator variables and controlling for some of the variation between studies tends to account for the larger values of the VPC observed in columns (2) – (4)[22]

Table (2.4) provided the weighted least squares results for comparative purposes. The tests of publication bias were significant in five out of the seven columns. The results presented so far are at best mixed. This makes it difficult to provide a definitive conclusion on the direction of the bias. Nonetheless, the same can be said of the empirical effect. The implication is that more work needs to be done in accumulating further studies as well as rethinking the design of the MRA. On the whole, the negative empirical effects do not outnumber the positive effects. We cannot clearly provide the direction of the empirical effect. This is evident in tables (2.2) that shows a positive effect and columns (3 & 7) of table (2.4) which shows a negative impact of AGOA beyond any publication bias. To the contrary, the evidence from the random effects MRA and the multilevel MRA point towards a negative true effect beyond any existing publication bias. As mentioned earlier, more work needs to be done in pinning down these effects. One way to do this is by broadening the scope of the present MRA.

[22]Table (A.3) in appendix (A) presents results for the case where coefficients larger than fifty have been excluded (columns 1 – 4). This results in the exclusion of Nouve and Staatz (2003) from the table. Column (5) further excludes Mueller (2008); Zappile (2011) since both report a single coefficient. The decision to exclude these studies is to check if their inclusion above is driving the results presented in this section. The results in the appendix shows that this is not the case and remain largely consistent with the earlier result. Precision is negative and significant in columns (2 & 3). Similar to table (2.5) above, the constant which allows for us to test publication bias remains insignificant implying the absence of publication bias.

Table 2.5: Multilevel meta analysis results

	(1)	(2)	(3)	(4)
	T-stat	T-stat	T-stat	T-stat
precision ($1/SE_i$)	0.00505	-1.177***	-0.341*	-1.072
	(0.009)	(0.104)	(0.156)	(1.058)
no. of covariates		0.0267***	0.0422***	0.0423***
		(0.002)	(0.000)	(0.000)
product effects = 1		0.809***	0.414***	0.545*
		(0.059)	(0.089)	(0.227)
logged dep. var. = 1		0.765***	0.356***	0.365
		(0.103)	(0.080)	(0.369)
country effects = 1		0.0432	-0.251**	0.0517
		(0.057)	(0.082)	(0.372)
published = 1		0.102^{+}	0.0118	-0.0233
		(0.056)	(0.013)	(0.020)
N (in logs)			-0.00548	0.00383
			(0.008)	(0.019)
no. of years (logs)			-0.362***	-0.379
			(0.089)	(0.430)
no. of countries (logs)			-0.0174	-0.0303
			(0.017)	(0.021)
annual = 1			1.083***	0.610
			(0.147)	(0.740)
time effects = 1			0.00476	-0.00493
			(0.065)	(0.065)
cross section = 1			-3.141***	-2.090
			(0.264)	(1.556)
other preferences included = 1			0.0579	-0.205
			(0.070)	(0.553)
gravity regression = 1			-0.378***	-0.539
			(0.091)	(0.349)
robust s.e. = 1			0.0401	0.00855
			(0.030)	(0.029)
single country analysis			1.149***	0.471
			(0.137)	(0.708)
Agriculture				-0.00923
				(0.012)
All/Total				0.409
				(0.398)
Apparel/Textiles/Leather				0.0384
				(0.087)
Energy/Electricity/Chemicals				0.0360*
				(0.017)
region = AGOA countries				-0.391
				(0.241)
Dependent var. = Exports				0.364
				(0.886)
Dependent var. = Imports				1.016
				(0.631)
GMM/IV				1.007**
				(0.339)
OLS/Time series				0.414***
				(0.112)
level of disaggregation = 6 digit and above				0.00775
				(0.534)
level of disaggregation = below 6 digits				0.471
				(0.501)
level of disaggregation = Sector totals				0.357
				(0.388)
Constant	2.386	0.630	-0.261	-0.486
	(2.718)	(1.053)	(0.816)	(1.212)
$\ln \sigma_u$: Random				

Constant	1.830***	1.132***	1.078***	1.394***
	(0.411)	(0.275)	(0.214)	(0.230)
$\ln \sigma_e$: Residual				
Constant	3.233***	1.898***	0.360***	0.283***
	(0.054)	(0.056)	(0.058)	(0.060)
Observations	179	179	179	179
LR test vs. linear regression	3.639	17.81	142.4	68.90
Variance partition component (%)	5.7	17.8	80.8	17.8

Standard errors in parentheses. All variables divided by the standard error of the reported AGOA coefficient. $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

2.5.4 Summary

A meta-analysis of the AGOA trade preference literature was conducted in this section of the chapter. The findings indicate the presence of a genuine empirical effect in the literature. There are some concerns though, of the changing signs of the precision coefficient and its non-significance in some columns (that is, β_0/α_0 and β_1/α_1). An explanation of the inconclusive evidence, might be due to the conservative number of studies included in the MRA. In addition, the presence of several coefficients in each study which requires appropriate modelling of the MRA might also be an issue. In resolving the issue of multiple coefficients in a study, we used a multi-level model as a robustness check of our estimates. However, with multi-level modelling a good number of studies need to be used since the estimator has asymptotic properties. Possibly, in the near future there would be more econometric studies on AGOA to help resolve any issues with our sample by providing a larger sample of studies.

The sign of the precision coefficient informs us of the direction of bias in the estimated coefficients provided in the AGOA literature. In the random effects meta-regression and the multilevel regression models the precision coefficient is negative pointing towards a smaller impact of AGOA than reported in the literature. On the contrary, the fixed effects WLS provides coefficients of the opposite sign in majority of the columns. This can be explained by the presence of heterogeneity which makes assumptions of the error term inappropriate. The random effects meta-regression and the multilevel models allow the errors to be more flexible and include an additional term to account for the variation in coefficients within the same study. We believe that the differences in coefficients and signs between the random effects based methods and the fixed effects weighted least squares is largely due to the heterogeneity present in the studies.

While the meta-regression provides an explanation of the variation in reported coefficients in the literature, the meta-analysis shown earlier provides a convenient way of pooling all coefficients reported. The pooled coefficient thus, provides information about the magnitude of the impact. The value of 12.8% provided in figure (2.6) and (2.7) therefore provides information about the likely impact of AGOA. Based on the studies used in the analysis a pooled estimate of 12.8% is a more reasonable estimate of the impact of AGOA and thus estimates that are much larger (or smaller) than 12.8% must be due to the study design adopted. The meta-regression then provides a way of exploring how these differences in the study designs affect the estimated AGOA study effects.

In concluding, we find inconclusive evidence on publication bias. In terms of a genuine empirical effect our conclusions are at best inconclusive, although there is some evidence that this effect is negative. We are unable to clearly present the direction of this effect. However, if we are to stand by the results from our multilevel model the effect seems to be negative. There is the need to accumulate more studies to further investigate the issue of publication bias and whether correcting for publication bias provides any empirical effect. We do not find strong evidence, that textiles & apparel significantly increase the reported t-statistics. On the contrary, there is some evidence on agriculture and energy, electrical and chemical products increasing the t-statistic values relative to other products, all things equal. Last but not the least, we do find some evidence that the number of countries and composition of countries matter when estimating the impact of AGOA. However, the direction of the effect and significance is mixed for the number of countries.

2.6 Conclusion

This chapter has provided a discussion of the theoretical and empirical literature. A quantitative review of the literature has also been carried out. The quantitative review tried to establish the presence of publication bias in existing studies. The analysis sought to provide evidence of the existence of any genuine empirical effect after controlling for publication bias and heterogeneity of the selected studies. Our results on publication bias is inconclusive. On the one hand, the funnel plots suggest the presence of publication bias as they show asymmetry in the estimated study coefficients found in the literature. On the other hand, the formal tests of publication bias are not significant in most cases. Even though table (2.5) did not have a significant constant, the level two variation in the study effects is significant which is consistent with the high test value of heterogeneity reported. Thus, the estimated coefficients vary widely within each study and across studies. Finally, the meta-analysis summarising the study effect, reports an AGOA study effect of around 12.8%. The pooled coefficient should serve as a reference point for studies on the AGOA impact. We now turn to a more detailed analysis of the AGOA impact on disaggregated trade data in the next chapter.

Chapter 3

The Impact of Trade Preferences on Exports of Developing Countries: The Case of the *AGOA* and *CBTPA* Preferences of the USA

3.1 Introduction

In this chapter the main question we ask is that, *"has there been an observed increase in the exports of AGOA and CBTPA recipients to the USA compared to their exports to the rest of the world?"* In answering the main question of the chapter we, (1) estimate the impact of the USA's preferences on exports of developing countries given their exports to the rest of the world (focussing on the AGOA, CBTPA and GSP preferences), (2) compare the impact at various levels of disaggregated trade (3) compare AGOA to the CBTPA preferences noting any significant differences (4) determine which products have been the export drivers while comparing the importance of apparel in the exports of the preference beneficiaries and (5) show that the results are robust to the choice of econometric technique and not sensitive to controls included in the regressions. In doing this, we contribute to the existing empirical literature on USA preferences by controlling for the exports of developing countries to the rest of the world. Secondly, we add to the few existing empirical work on the CBTPA preferences. We also find support for the importance of apparel and textiles in AGOA (and CBTPA) exports as has been underscored by for example Collier and Venables (2007) and Frazer and Van Biesebroeck (2010). Finally, we show that with large N panels the random effects estimator is inconsistent and inefficient. However, the Heckman two step procedure, fixed and Mundlak corrected random effects estimators provide similar estimates.

The rest of the chapter is organised as follows. Section (3.2) shows the trends in imports and the competitiveness of recipients of American preferences. Section (3.3) presents the data, econometric framework and modelling problems requiring our attention. We show how we address these problems in our analysis. Section (3.4) is a discussion of the results. The conclusion is then, provided in the final Section (3.5).

3.2 Competitiveness and trends in USA imports from selected AGOA and CBI beneficiaries

Figure (3.1) below provides the level of imports observed under each preference. Additionally, the GSP and other regional preferences are included to show the overall trends in American preferences over the period 1997–2011. As indicated by the graph, the volume of AGOA exports are quite close to that of the GSP and has exceeded the GSP in some periods. This massive jump from zero imports to the level of the GSP imports is what much of the studies on AGOA are capturing. However, the financial crisis has had its effect on all preferences as shown by the dip in imports around 2006–2007 for majority of the preferences. The crisis appears not to have affected CAFTA-DR exports which maintains its gradual increase.

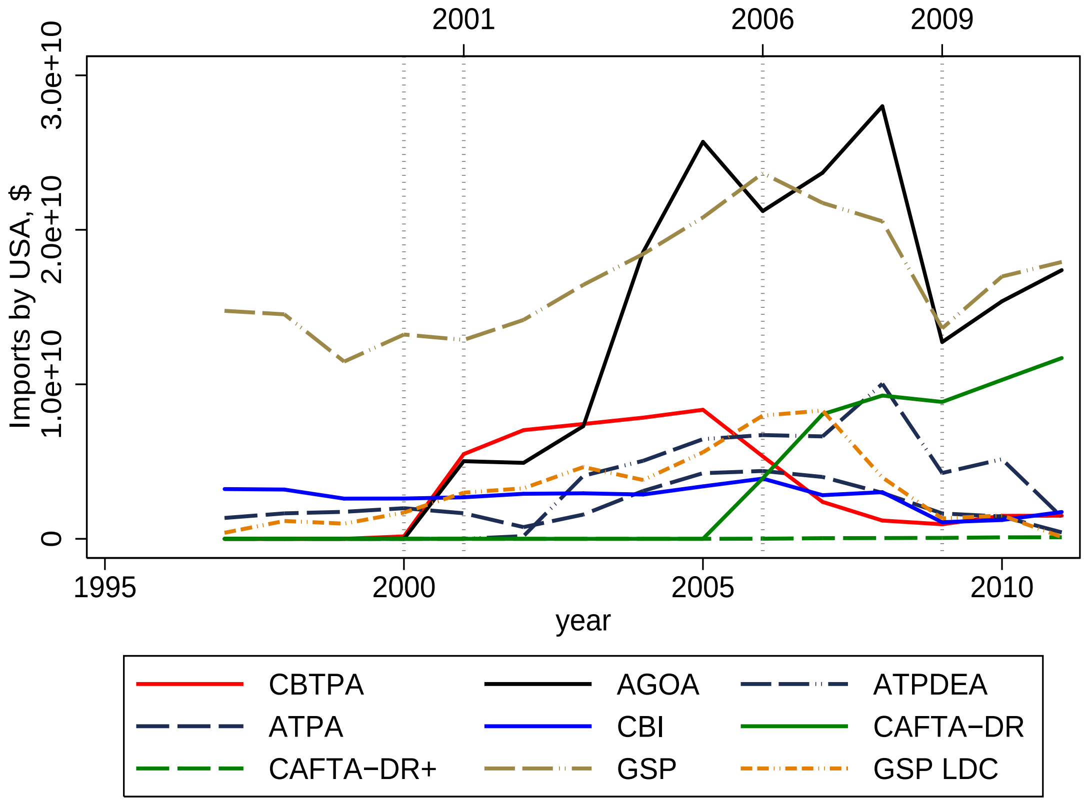
In drawing conclusions on the preceding comments, one must not lose sight of the fact that, majority of the AGOA beneficiaries export a significant portion of their previous GSP products under AGOA. Thus, the growth of AGOA exports is in a way matched by a decline in GSP exports (as well as MFN exports) making the impact and increase in AGOA shown larger. The GSP products have a limited number of zero and low tariff lines compared to the other preferences. Nonetheless, when countries become more competitive in certain products their GSP preferences in those products are withdrawn. The withdrawal of the GSP or removal of the preferences for specific products is one of the built-in mechanisms of the GSP to ensure that countries that have exceeded the income and competitiveness criteria for selection into the GSP are removed (GAO, 2008). This way, the USA is able to maintain the tariff preferences for countries that continue to fall below the income and competitiveness criteria set. This process of withdrawing or limiting the preferences is referred to as “graduating” the countries or products involved. Similarly countries previously “graduated” can be “de-graduated”—that is returned to the GSP if they fall below the income and competitiveness thresholds. These, thus serve to limit the potential for much higher growth in GSP products.

Finally, figure (3.2) provides information on EU and USA tariff lines. Figure (C.1) provides further information on the competitiveness of the various regional preferences in the American market. Additional tables (tables B.1–B.2) and graphs (figures B.1–B.5) are presented in the appendix to this chapter (appendix B). Figure (3.2) shows the mean and maximum applied tariffs as well as the number of tariff lines of the EU and USA (3.2(a)), (3.2(b)), and (3.2(c)). These are shown for the agricultural and industrial sectors as well as total exports. Both importing countries do have higher tariffs in agriculture compared to industrial products. While the simple and weighted average tariffs have declined from their 1997–2000 average for the EU, the simple average tariff for the USA has increased marginally. The average tariffs for all imports is generally lower for the USA compared to the EU in both periods. Additionally, the USA’s average for industrial imports is lower than that of the EU. Panel (3.2(b)) shows that the maximum tariff rate was 716% for agricultural products for the 1997–2000 period[1]. In 2001–2010, the maximum tariff in this sector fell to 350%[2].

[1]This was the tariff for HS 040390–buttermilk, curdled milk and cream, kephir, other fermented milk, cream products. This was the maximum tariff observed in 1997.

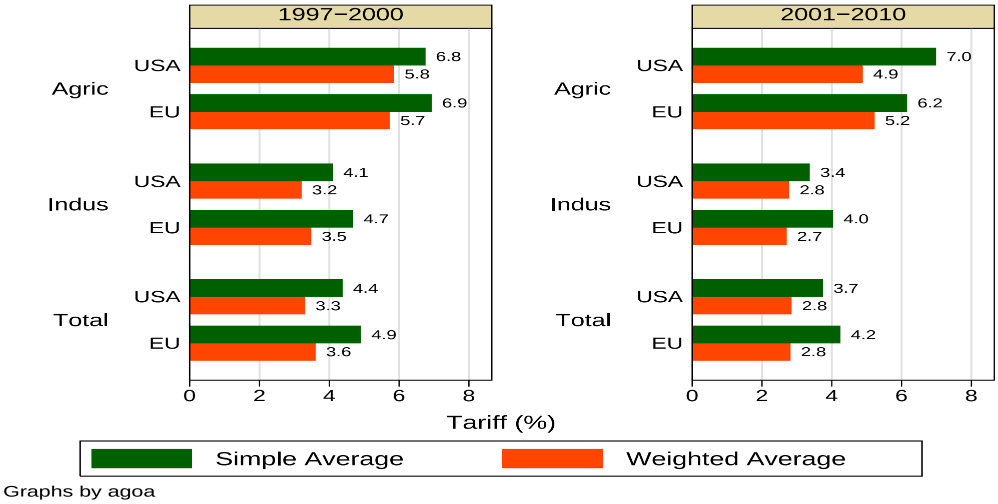
[2]HS 040390 was no longer the highest tariff. The highest tariff now applied to a number of products in the HS 24 category—namely, six digit product codes 240110, 240120, 240130, 240310, 240391 and 240399. These products are various categories of tobacco and include tobacco and tobacco substitutes, tobacco waste, tobacco extracts essences and other manufactured tobacco.

The EU on the contrary, had much lower peak tariffs than the USA. The highest tariffs are still in the agricultural sector in the 1997–2000 period. Smoking tobacco (HS 240310) had the highest tariffs for the 2001–2010 period for the EU. The final panel (3.2(c)) shows that the EU has more products receiving a tariff at the tariff line level. In the period 2001–2010, the USA has been able to increase the number of free lines beyond what the EU was offering in the earlier period.

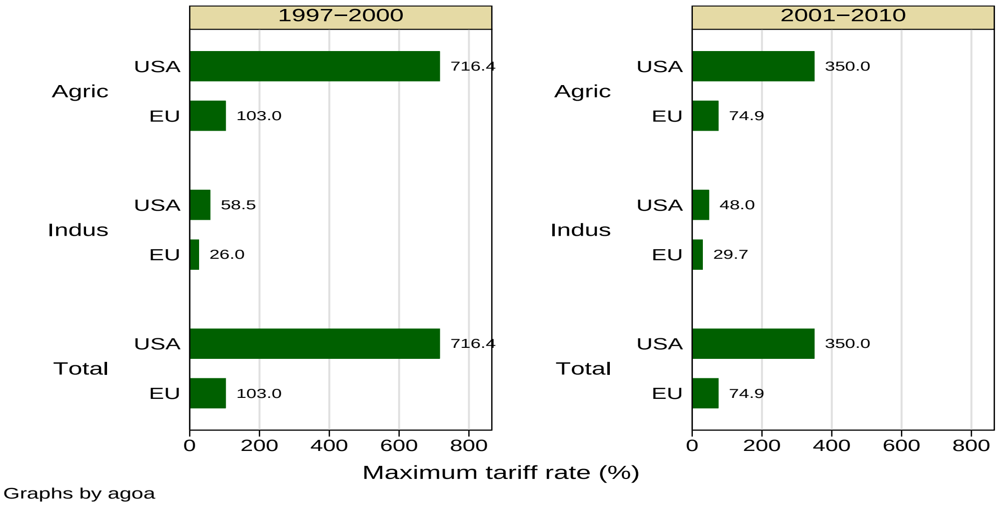


AGOA: African Growth & Opportunity Act; ATPDEA: Andean Trade Promotion & Drug Eradication Act; ATPA: Andean Trade Preference Act; CAFTA-DR(+): Dominican Republic–Central America Free Trade Area (plus); CBI: Caribbean Basin Initiative; CBTPA: Caribbean Basin Trade Protection Act; GSP (LDC) General System of Preferences (for LDCs). Source: Calculations based on USITC data

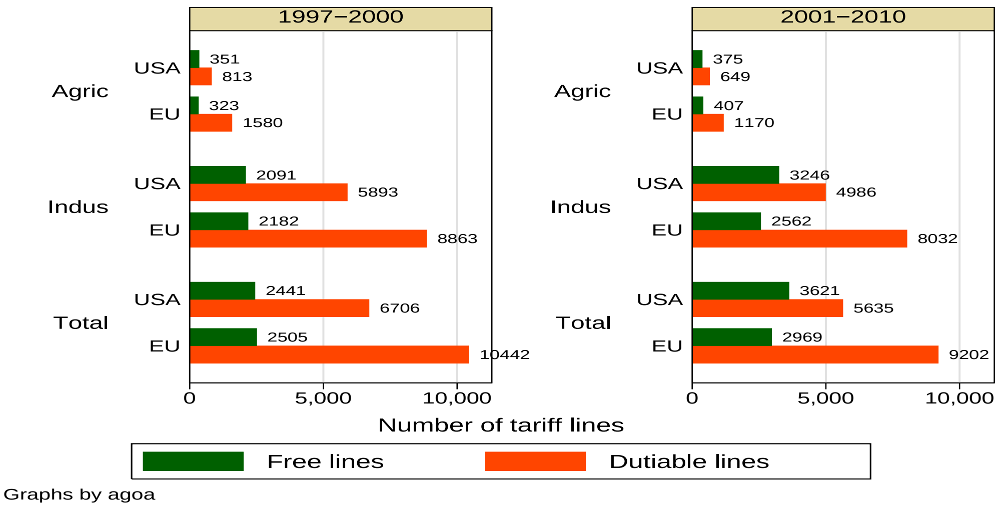
Figure 3.1: Total USA imports under various preferential programmes: 1997 – 2011



(a) Mean applied tariff rates



(b) Maximum applied tariff rates



(c) Tariff lines

Sectors shown are agriculture (agric), industry (indus) and total exports.
Source: Author's elaboration of data from WITS (UN TRAINS data): http://wits.worldbank.org/wits/

Figure 3.2: Mean Tariff rates and lines of the EU and USA

3.3 Data, econometric framework and modelling issues

3.3.1 Data

Data for the analysis is obtained from the World Integrated Trade System[3] (WITS) which queries data from UN Comtrade for export (and import) data and UN TRAINS for the tariff data. Gross domestic product is obtained from The World Bank's World Development Indicators[4] (WDI) and gravity type variables (*viz.*, landlocked, area, latitude, number of cities, official language, etc) are obtained from the CEPII distances database[5]. In addition, our political variables (military and religion) are obtained from the Database of Political Institutions[6] (DPI) and democracy time series dataset [7]. Finally, the preferential dummies are constructed based on information sourced from the WITS preferential database and USITC[8] The remaining variables constructed (*viz.*, RCA and market size) are based on the variables obtained from the sources above. Table (3.1) provides further information on the variables used as well as summary statistics.

We selected all HS 6-digit categories within the following products, 01:- Live Animals, 02:- Meat and edible meat offal; 25:- Salt, sulphur, earth & stone, plastering, etc; 26:- Ores, slag and ash; and 50–63:- Apparel and clothing. The products were selected based on whether some of the 6-digit products were captured in the preference. Also, of interest were products that form a significant component of developing country exports. Apparel and Textiles are an important component of both AGOA and CBTPA preferences hence their inclusion. GAO (2008) notes that, approximately 94% and 70% of all imports under AGOA and ATPA/ATPDEA comprised fuel imports respectively. Apparel imports were 30%, 10% and 3% of total imports under CBI, ATPA and AGOA respectively (GAO, 2008).

We use annual data covering the period 1996 – 2009. There are 166 countries and 981 different products at the 6 digit level in the dataset. The products comprise of 808 apparel and textile and 173 non apparel products at the 6-digit level. Fewer products are however, exported by several of the countries. The non apparel products consist of the 6 digit products falling within the live animals, meat and offal and salt and ores sector as indicated above. For example, for the African countries fewer than 400 products are exported in any given year. Of these products there are some products that are not exported in all years. In Table (3.1), the probability of exporting a particular 6-digit product in our sample is 0.3, the average number of free tariff lines (indicating zero tariff rates) is 0.4, the average weighted MFN tariff is 9.03% and the average applied tariff is 8.09%. The probability of exporting under the GSP, AGOA, CAFTA-DR and CBTPA are 0.008, 0.004, 0.01 and 0.007 respectively.

The tariff margins are constructed based on information provided at the 6-digit level on the MFN and applied tariff provided by WITS. In cases where missing values of the MFN and applied tariffs are encountered we checked the preferential status of the country and replaced the missing

[3] http://wits.worldbank.org/wits/

[4] http://data.worldbank.org/

[5] Centre d'Etudes Prospectives et d'Informations Internationales: http://www.cepii.fr/anglaisgraph/bdd/distances.htm

[6] Thorsten Beck, George Clarke, Alberto Groff, Philip Keefer, and Patrick Walsh, 2001. "New tools in comparative political economy: The Database of Political Institutions." 15:1, 165-176 (September), World Bank Economic Review.

[7] Norris, 2009, http://www.hks.harvard.edu/fs/pnorris/Data/Democracy%20TimeSeries%20Data/

[8] http://dataweb.usitc.gov/

values with the average estimate based on the region, preference group and product. Trade flow data not provided by UN Comtrade were assumed to be zero. We instead used the imports reported by the partner country of the exporter rather than the exports provided by the exporters. The use of the imports by the partner country rather than the exports of the exporter is referred to as "mirror exports"—since this is supposed to be equal to the reported exports with any difference in value attributable to costs, freight and insurance. Piermartini and Teh (2005) notes that, mirror exports are more accurately recorded than the exports reported by the developing countries. The reason for this, is that, imports entering a country are inspected at the port by custom authorities and the relevant tariffs are applied—this leads to more accurate recording of imports compared to exports that may not be taxed as they are shipped out of the exporting country.

Table 3.1: Variable definitions and summary statistics: 1996 – 2009

Variable Name	Variable Description	Source	HS6-Mean	HS4-Mean	HS2-Mean	Time invariant (at HS6)-Mean
Probability of exporting	Dependent variable for 1st stage of Heckman. 1 if country exports to the USA	UN Comtrade	0.342	0.282	0.16	
US/World Import ratio (logs)	Dependent variable for all other regressions	UN Comtrade	0.323	0.293	0.202	
US/World Import ratio	Dependent variable for Poisson regressions	UN Comtrade	9824.379	92813.282	-2.82E+004	
Country's RCA (log)	RCA calculated by product for each country	UN Comtrade and World Bank	0.588	-1.974	-1.821	
Market size, USA.World (logs)	Market size of USA relative to world	UN Comtrade	0.895	0.881	0.724	
Margin (MFN and applied tariff)	Tariff margin calculated using MFN and applied tariff	UN TRAINS	-0.108	-0.126	-0.18	
AGOA country dummy	1 if country is an AGOA beneficiary	USITC/WITS Preferential database	0.061	0.083	0.106	
GSP country dummy	1 if country is a GSP beneficiary	USITC/WITS Preferential database	0.492	0.535	0.595	
GSP LDC country dummy	1 if country is a member of GSP LDC	USITC/WITS Preferential database	0.053	0.077	0.116	
CBI	1 if member of CBI	USITC/WITS Preferential database	0.043	0.059	0.089	
CAFTA-DR	1 if member of CAFTA-DR	USITC/WITS Preferential database	0.01	0.01	0.01	
AGOA product dummy	1 if product received AGOA preference	USITC/WITS Preferential database	0.004	0.003	0.002	
GSP product dummy	1 if product received GSP preference	USITC/WITS Preferential database	0.008	0.01	0.009	
CBTPA product dummy	1 if product received CBTPA preference	USITC/WITS Preferential database	0.007	0.005	0.002	
landlocked	1 if country is landlocked	CEPII	0.137	0.16	0.187	0.174
Area (log)	Log of Area in square km	CEPII	11.965	11.833	11.465	11.635
Number of cities	Number of Cities in a country	CEPII	23.542	23.317	22.684	23.043
latitude	Latitude in degrees	CEPII	25.734	23.638	20.786	22.15
English Speaking	1 if English speaking country	CEPII	0.196	0.212	0.239	0.224
Spanish speaking	1 if Spanish speaking country	CEPII	0.127	0.127	0.118	0.123
Africa	1 if African country (base category is Middle East, Asia, Europe & North America)	CEPII/Democracy time series dataset/ WDI	0.124	0.157	0.2	0.183
Latin America & Caribbean	1 if Latin America and Caribbean country	CEPII/Democracy time series dataset/ WDI	0.17	0.187	0.215	0.198
NAFTA	1 if member of North American Free Trade Area	USITC/WITS Preferential database	0.023	0.02	0.013	0.016
Majority Christian	1 if country has a Christian majority	Democracy time series dataset	0.61	0.593	0.567	0.579
Majority Muslim	1 if country has a Muslim majority	Democracy time series dataset	0.198	0.221	0.248	0.236
Other religion (base)	1 if other religion (viz, Jews, Hindu, Eastern, Traditional, etc)	Democracy time series dataset	0.192	0.187	0.185	0.185
Military	1 if chief executive is a serving military officer	Database of Political Institutions (DPI)	0.081	0.092	0.111	
Number of free lines	number of tariff free lines within each HS category	UN TRAINS	0.444	1.59	12.384	
Observations			1047124	292598	37567	121777

(a) The means above are for the sample of positive trade. There are cases where a country exports to the rest of the world but not to the USA hence the probability of exporting is less than 100%. After incorporating the zero trade scenarios the sample size for HS6, HS4 and HS2 becomes 2279844, 501984 and 41832 respectively.The probability of exporting then becomes 0.157, 0.107 and 0.145 for HS6, HS4 and HS2 respectively. (b) The preferential country dummies, religious dummies, military, regional and language dummies have marginally higher means for the larger sample. However, the preferential product dummies and constructed trade variables have marginally lower means for the larger sample

3.3.2 Methodology

The econometric formulation for investigating trade preferences at the macro level is adopted from Collier and Venables (2007). They estimate the impact of the USA's AGOA and EU trade preferences (given by dummies) on the log of exports from developing countries to the USA relative to the EU-15 countries. They control for market size and market demand shocks. We depart from Collier and Venables (2007) by looking at disaggregated 6 digit HS chapters 1, 2, 25, 26 and 50-63[9] and instead use the ratio of imports by the USA relative to imports by rest of the world for each country (see equation 4). Additional controls included here are each country's RCA, lagged values of applied preferential and MFN tariffs (or preference margins) at the six-digit product level and lagged political controls such as democracy and political stability. We include these variables to control for (a) the competitiveness of the exporting countries, (b) the political climate of the country and (c) the preference margin. We expect countries with a governing democracy, rule of law, competitive industry in the sectors chosen and high preference margins to raise exports to the USA. Conversely, countries with a poor democratic record, lack of rule of law and facing low preference margins to have lower exports to the USA. In addition, imports under the GSP is controlled for by interacting our GSP dummy with the CBTPA and AGOA dummies.

At the six digit level of disaggregation, zero exports would be observed for some countries hence the Heckman two-stage panel estimator is more appropriate in modelling Equation (5). This is needed to correct for selectivity bias in the decision to export a particular HS 6 digit product in the case of the Heckman selection. Essentially, there is self-selection in the exports of products at highly disaggregated levels, whereby countries do not randomly choose to export a particular product. Our panel approach to estimation allows us to include fixed effects (exporter and product fixed effects) and time effects to control for some of the unobserved characteristics and market shocks respectively. The principal model is the Heckman selection[10] — the Poisson pseudo maximum likelihood estimator (PPMLE), panel fixed effect, and Mundlak corrected random effects estimators are included for comparative purposes.

Equation (3.1) and (3.2) below model exports from country i (partner) to j (USA) and rest of the world as a function of exporter nation characteristics (E), USA and World characteristics — captured by market size (M), between country characteristics (d) and an error term (μ). The total imports by the USA relative to the World of product p from all countries is the proxy for market size—which additionally controls for market demand shocks in these importing regions. The between country characteristics (d) includes fixed elements—for example distance and constant trade preferences over time as well as time varying country-pair specific trade preferences (Collier and Venables, 2007, 1338-9). We proxy these using country-product-year fixed effects for the constant parts and dummies for trade preferences for the time varying parts. Equation (3) is then the ratio of the first two equations—this substitutes out the exporter characteristics leaving us with

[9] 1–Live animals; 2–Meat and edible meat offal; 25–Salt, sulphur; earth & stone; plastering, etc; 26–Ores, slag and ash; 50-60–Textiles; and 61-63–Textile articles (apparel and clothing).

[10] Selection is primarily based on exports to the USA. If a country does not export to the USA then in the first stage the dependent variable is zero. If exports to the USA are observed the dependent variable takes the value of one. Thus, the first stage is the probability of exporting to the USA. The second stage the outcome equation then models all non-missing flows. In the case whereby either exports to the USA or ROW is missing we experimented with two models, (1) we excluded these in the second stage and (2) replaced the missing value with 1 and took the ratio of both destinations. Both methods yielded qualitatively similar results in terms of the coefficient and the significance.

an estimable equation in the form of Equation (3.5). Equation (3.4) is our selection equation and the *Inverse Mills Ratio* calculated from (3.4) is incorporated into (3.5) to complete the Heckman two-step procedure. In chapter 2, we provided a link between the model presented in this chapter and the gravity model. The key difference was the absence of the gravity constant and the exporter country characteristics which is dropped from the model due to the dependent variable being defined as the ratio of exports to two destinations. In other words, the exporter country characteristics cancel out making it easier to estimate our model. In our actual implementation of the model we rely on the usual gravity type variables and incorporate additional variables as discussed below.

The PPMLE is estimated using Equation (3.3) in its multiplicative form. The Poisson regression log linearises this equation and thus our results would be similar to the log linearised model in Equation (3.5) (for example, Herrera, 2010; Silva and Tenreyro, 2003). Our argument is that a country given a preference would then decide which products to produce. In this decision, rules of origin, cummulation rules, preference margins, competitiveness and other factors determine whether the country exports to the USA. Our exclusion restriction includes the preference margin and this is discussed further in the next section.

$$X_{ip,j} = E_i(t) * M_j(t) * d_{ip,j}(t) * \mu_{ip,j}(t) \tag{3.1}$$

$$X_{ip,w} = E_i(t) * M_w(t) * d_{ip,w}(t) * \mu_{ip,w}(t) \tag{3.2}$$

$$x_{ipt} = M_t * d_{ipt} * \mu_{ipt} \tag{3.3}$$

$$\begin{aligned} \text{exports}_{ipt} = \alpha + \beta' TP_{it} + \gamma_1 lat + \gamma_2 \text{RCA}^{i,w}_{ipt} + \gamma_3 Mil_{ipt-1} \\ \gamma_4 \text{tariff margin}_{ipt-1} + \Gamma' Z^a + \eta_{ip} + \eta_t + \mu_{ipt} \end{aligned} \tag{3.4}$$

$$\text{exports}_{ipt} = \begin{cases} 1 & \text{if} \quad \text{positive exports} \\ 0 & \quad\;\; \text{otherwise} \end{cases}$$

$$\begin{aligned} \ln x_{ipt} = a + \alpha' TP_{ipt} + \gamma_1 \text{MSize}_{pt} + \gamma_2 \text{RCA}^{i,w}_{ipt-1} + \\ + \hat{\lambda}_{ipt} + \delta' Z^b + \eta_{ip} + \eta_t + \epsilon_{ipt}. \end{aligned} \tag{3.5}$$

Where: $x_{ipt} = X_{ip,j}/X_{ip,w}, M_t = M_j/M_w, d_{ipt} = d_{ip,j}/d_{ip,w}$, i, p, and t subscripts refer to country, product and time respectively, j refers to the USA while w refers to rest of the world, "a" in Equation (3.5) is the constant of the regression. The log of the dependent variable is taken as $\ln(1 + X)$. Tariffs and political variables are lagged in order to avoid introducing any simultaneity or endogeneity into our model.

X_{ij}	is Imports from partner i
E_i	is exporter nation characteristics
M_j	is importer characteristics
d_{ij}	is between country characteristics - given by trade preferences offered by j to i
μ_{ipt}; ϵ_{ipt}	is an error term
TP_{it}	is trade preferences offered by the USA. It takes the value 1 from the year in which a country first receives the preference and 0 before[11]. Includes, GSP, AGOA and CBI beneficiaries
TP_{ipt}	is trade preferences offered by the USA. It takes the value 1 for a product exported under a preference and 0 otherwise[12]. Includes, GSP, AGOA and CBTPA beneficiaries for each product

$MSize_{pt}$	is market size the ratio of total imports of our selected commodities into j excluding country i.
tariff margin$_{ipt}$	calculated as $\frac{\text{MFN tariff - Applied HS tariff}}{\text{MFN tariff}}$ for each country, year and product.
Mil	is Military - 1 if chief executive is a serving military officer
$\hat{\lambda}_{ipt}$	Is the inverse Mills ratio from the first stage regression, calculated as: $\frac{\phi(\cdot)}{\Phi(\cdot)}$, where $\phi(\cdot)$ is the standard normal probability density function and $\Phi(\cdot)$ is the standard normal density function of the Equation (4) when $E(exports = 1 \mid covariates)$.
η_t	Time effects
η_{ip}	exporter and product fixed effects in the fixed effects regression. Is the random effects in the panel random effects estimator
Z^a	vector of control variables – latitude, natural log of area, number of cities, Number of Free lines, dummies for Africa, Latin America & Caribbean, landlocked Christians, Muslims, English and Spanish speaking countries
Z^b	vector of control variables – latitude, natural log of area, number of cities, dummies for landlocked, Africa, Latin America & Caribbean, NAFTA, CAFTA, English and Spanish speaking countries
RCA	Based on Balassa (1967)[13]the revealed comparative advantage (RCA) is calculated as: $\text{RCA}^{i,w}_{ipt} = \left(\frac{X^w_{p,i}}{\sum_p X^w_{p,i}}\right) \div \left(\frac{X^w_{p,w}}{\sum_p X^w_{p,w}}\right)$ where: $X^w_{p,i}$ is exports of product p from country i to the World and $\sum_p X^w_{p,i}$ is total exports from country i to World, $X^w_{p,w}$ and $\sum_p X^w_{p,w}$ are the world exports of product p and total exports respectively

3.3.3 Econometric modelling issues

We attempt various econometric techniques *viz.*, the Heckman selection and the Poisson estimators. These are then compared to traditional estimates from the fixed effects and random effects estimators based on positive imports. We employ the fixed effects regressions in most of our estimations as this approach allows for the existence of a correlation between the fixed effects and the regressors (Baltagi, 2001; Greene, 2003; Wooldridge, 2002). Secondly, the fixed effects approach minimises the omitted variable problem as the fixed effects capture variables omitted from the model leaving the coefficients unbiased to a large extent. A problem with the fixed effects is the inability to estimate time invariant variables. However, the time invariant variables can be recovered from a regression of the variables on the extracted fixed effects. The time invariant variables are not pivotal to our analysis so this is pursued only in a few regressions for comparative purposes—that is to compare the coefficients to those of the random effects, which allows for time invariant variables.

Unlike the fixed effects, the random effects approach does not allow for a correlation between the random effects and the explanatory variables. The estimator assumes this correlation to be zero. Hence, in the presence of a correlation, the random effects estimator becomes inconsistent and

[11]Definition allows preferences to overlap for each country. Thus a country can be an AGOA and a GSP beneficiary. To control for these overlaps we include interaction terms for those cases where countries have two or more preferences

[12]Previous footnote applies here also

[13]Balassa, Bela 1967, Studies in Trade Liberalization, John Hopkins Press, Baltimore: Maryland

inefficient. Mundlak (1978) argues that the random effects estimator is biased due to misspecification when there is a correlation between the random effects and the explanatory variables. To overcome this, Mundlak (1978) suggests adding the mean of the explanatory variables as additional regressors in the random effects estimator. Thus in our case the η_{ip} in Equation (3.4) and (3.5) (when estimated by the random effects estimator captures the random effect parameter) can be specified as:

$$\eta_{ip} = \varphi' \bar{X}_{ip} + \vartheta_{ip} \tag{3.6}$$

where:

$\vartheta_{ip} \sim N(0, \sigma^2_{\vartheta})$, $\bar{X}_{ip} = \frac{\sum_{t=1}^{T} X_{ipt}}{T}$ and X is the vector of time varying explanatory variables in Equation (3.4) or (3.5)

This is pursued for all the random effects estimators presented in the results section. The *Hausman test* allows a choice to be made between the fixed effects and the random effects estimators. In addition, the *Breusch and Pagan test* provides an avenue for testing for the presence of random effects in our model. In Table (3.3) we report the *Breusch and Pagan test* and these are significant for all random effects estimated (with and without Mundlak's correction). The *Hausman test* is not pursued since we employ the fixed effects model to capture country and product specific effects that are not captured by the variables included in our model. The fixed effects are significantly different from zero in all estimations as provided in the table's footnotes.

We now turn to specific econometric modelling issues found in the trade literature that requires our attention in this chapter—as well as revisit some of the issues raised in the preceding paragraphs. The *Heckman selection* and *Poisson pseudo maximum likelihood (PPMLE)* have become dominant techniques in empirical trade studies (for example, Helpman et al., 2007; Herrera, 2010; Silva and Tenreyro, 2003, 2006, 2009; Silva et al., 2010). Given the presence of zeros in the trade data and the large literature on selection into exporting we pursue the Heckman selection as one of our models. In light of the zeros we also pursue the PPMLE. The Heckman selection is motivated by the desire to model the self-selection into export markets (for example, Agostino et al., 2007; Cardamone, 2007).

It was earlier mentioned that, mirror exports are used to help reduce the missing or unrecorded exports of developing countries. The missing data problem is not entirely resolved as this is symptomatic of highly disaggregated trade data. However, we are reassured of the reliability of the import data since imports tend to be more accurately recorded compared to export data (for example, Piermartini and Teh, 2005). The reason being that, tariffs are applied at the border, hence more reliable data on imports are collected. Thus, in our case, imports by the USA would be more reliable since the USA has to decide which imports are allowed in duty free, under the various preferences, MFN or at normal tariff rates—this makes them more reliable. One can safely conclude that, most of the remaining missing or unrecorded values in the dataset represent countries not exporting that particular product. This essentially motivates Heckman's two stage panel estimator to control for self-selection into export markets and thus reduce the problem of selection bias that arises.

An issue prevalent in pursuing Heckman's selection estimator is finding appropriate exclusion restrictions. The use of appropriate exclusion restrictions reduces the bias in standard errors calculated at the second stage and allows the model to be identified (Bushway et al., 2007). Nonetheless, the use of a probit in the first stage without the necessary exclusion restriction holds, as the non linear nature of the probit estimator provides identification (Zabel, 1992). In circumstances where both the first stage and the second stage are non linear[14] then the exclusion restrictions are important in identifying the second stage (Zabel, 1992). More importantly, failure to find adequate exclusion restrictions implies that the second stage cannot be identified in this case and estimates of the second stage would be inconsistent and inefficient (Zabel, 1992). To overcome these issues we adopt Jensen et al.'s (2002) approach of estimating a Mundlak corrected random effects probit in the first stage and a fixed effects estimation in the second stage. This reduces the problem of having omitted variables in the first stage as well as mis-specifying the model. The challenge in carrying out the first stage probit in our case is getting the model to converge—especially for the disaggregated product regressions. If faced with this problem we can safely adopt a linear fixed effects or a Mundlak corrected linear random effects estimator for the first stage. This, then requires us to include valid restrictions in our first stage to aid the identification of our second stage regressions.

In previous work, Helpman et al. (2007) adopted religion as their exclusion restriction in modelling firm heterogeneity within the gravity framework. However, this has been criticised by some authors (for example, Silva and Tenreyro, 2009) who do not find a link between religion and the probability of exporting. We instead use the preference margin, military and preference dummies created at the country level[15]. Our argument is that, a country given a preference would then decide which products to export. This decision would be influenced by rules of origin, cumulation rules, preference margins and competitiveness at the product level as well as other factors that determine whether the country exports to the USA (*viz.*, autocracy, number of free lines, landlocked among others). In the second stage, the preference margin serves as an exclusion restriction. Arguably, it would be more preferable to have the preference margin in the second stage as a determinant of the level of exports. Mainly because the preference margin may also affect the levels of exports. The decision to include it here was to have an exclusion restriction and provide more focus on the product dummies in providing the AGOA impact. Further, the data confirms our choice of the preference margin as an exclusion restriction although theoretically, we might have included it as an exclusion restriction.

Aiello et al. (2010); Cardamone (2007); Cipollina and Pietrovito (2011); Cipollina et al. (2013) provide a discussion of the drawbacks of using dummies. Aiello et al. (2010) rather use the dummy approach in their analysis. Given, that this is within the difference-in-differences approach the AGOA product dummy would provide the average treatment effect and we do not want the impact to be affected by any correlation between the preference and the preference margin. Admittedly, this is an area that deserves more thought and that future analysis should attempt at addressing this issue. After a country has decided on exporting, emphasis now lies on factors such as the competitiveness and capacity of the country to export more products. In our analysis, the preference

[14]It could also be that both stages are linear if the first stage is based on a linear probability model. There are very few applications of this and it is a departure from Heckman's presentation of the selection estimator

[15]The product level is not used in this case and it is irrespective of whether the country uses the preference or not.

margin would be captured by the product dummies[16] at the second stage and in the other regressions captured by the country-product fixed effects. The dummy-time interactions in later regressions capture annual variations and modifications occurring within the preference programmes.

Similarly, the PPMLE has been shown to provide consistent results for gravity models and in our case it would also yield consistent estimates. The *zero inflated poisson (ZIP)* can be an alternative to the PPMLE since it models excess zeros through a logit and hence solves any headaches with selection[17]. However, this is not pursued due to estimation problems encountered. The problems are related to the large number of parameters. The large number of fixed effects prevents the model from converging and potentially introduces an incidental parameters problem. Another estimator within the *pseudo maximum likelihood* family, the *negative binomial regression (NBREG)* is also a useful alternative in the presence of over-dispersion in the dependent variable. However, the NBREG is sensitive to the scaling of the dependent variable and is restrictive. It does not do well in the presence of excess zeros, thus it is not pursued here. Bosquet and Boulhol (2010) show that the NBREG PMLE is not consistent and is sensitive to the scale of the dependent variable. Thus, it is not good for modelling trade flows. On the contrary, the PPMLE is consistent as long as the conditional mean function is correctly specified (Cameron and Trivedi, 1998). As a result the PPMLE can be applied to data generating processes for the dependent variable in cases where it is not even poisson distributed (ibid.).

Finally, Piermartini and Teh (2005) argue that GDP is unreliable in estimations using disaggregated data and that the right controls in such cases is output data for the exporting industry or sectoral-country specific effects. In this paper, product-country effects are included in all fixed effects estimations and an additional variable, the revealed comparative advantage for each country is included to capture each country's competitiveness at the product level. The revealed comparative advantage is potentially endogenous in the regression—the more competitive an exporter is in a particular product, the more of this product is exported. Finding instruments in this case, would prove difficult—thus we use the lagged values of the regressor to reduce the endogeneity problem that might exist. This hopefully, solves the problem and reduces any omitted variables problem resulting from not controlling explicitly for sectoral output.

3.4 Results and discussion

The results in this section focus on the HS-6 digit level of disaggregation. All regressions apart from the regression of time invariant characteristics on the fixed effects in Table (3.5), include country-product and time fixed effects. Furthermore, with the exception of the random effects probit and the *Poisson PMLE* fixed effects, all other regression estimators report robust standard errors clustered around the country-product categories. Table (3.3) reports three different estimators—the fixed, Mundlak corrected random effects and the ordinary panel random effects estimators. Table (3.4) reports the Heckman two-step estimator and the Poisson PMLE. This allows a comparison of the various estimators and also shows any indication of bias in our chosen Heckman estimator.

[16]The dummies are defined at the product level and indicate products that are processed under the preference and exported as such. The interaction of the preference product dummies with the year provides additional changes in the preferences occurring each year. This possibly captures variations in the preference margin for each product exported under the preference.

[17]Thanks to Barry Reilly for pointing this out

Table (3.5) presents the time invariant variables regressed on the extracted fixed effects reported in the first four columns of Table (3.3) as well as the Heckman second stage estimations in Table (3.4). Finally, Table (3.6) allows us to check the sensitivity of our estimates to the exclusion of OECD and European countries as well as China and Hong Kong from our regressions. In Appendix II, further results are presented showing estimates of other levels of disaggregation (HS2 and HS4). This is to show whether our estimates are sensitive to the level of disaggregation. Additionally, the tables in the appendix also compare estimates of non apparel and textiles to those of apparel and textiles to confirm whether the USA preferences are being driven by apparel and textiles.

We next discuss the results in the main paper. Columns (1) - (4) of Table (3.3) reports estimates from the fixed effects regression. The difference between columns (1) and (2) is the inclusion of the military variable in column (2). Columns (3) and (4) augment Columns (1) and (2) respectively with the interaction of AGOA and CBTPA preferences with year dummies respectively. The base year for the AGOA-year interaction is 2001 and that for the CBTPA-year interaction is 2000. Thus these two interaction terms are dropped from the regression and become the reference categories in interpreting the remaining preference-year interactions in the regression. Columns (5) - (8) reports the Mundlak corrected random effects—these follow the same pattern as columns (1) - (4). The main difference is the incorporation of time invariant variables. Thus in column (6) and (8) dummies for Christians and Muslims (base category is other religions) are included in addition to military. The inclusion of military and the religious dummies in these models allows us to test whether they can be omitted from the model and used as valid exclusion restrictions for the Heckman two-step estimator. We can reject the alternate hypothesis that the military coefficient is different from zero at the 5% level of significance in columns (2), (4), (6) and (8)—thereby indicating that it is not correlated with the dependent variable in the second stage. We cannot do the same for the religious dummies which are significantly different from zero at the 0.1% level and thus correlated with our dependent variable. Hence, if used in the Heckman first stage as an exclusion restriction, the residuals might be correlated with the second stage error. The Muslim dummy is however, not significant at conventional levels in columns (4) and (8) of Table (3.5) when regressed on the fixed effects. The final two columns of Table (3.3) reports the ordinary random effects estimator.

The AGOA, CBTPA and GSP preferences are significant in all eight columns of Table (3.3). Our controls CAFTA-DR, the lag of each country's RCA and market size of the USA are also significant in all columns. The interaction of GSP and AGOA is not significant in any of the columns of the table. The interaction of CBTPA and GSP is however, significant in our random effects type estimators. With the exception of the English speaking dummy all other time invariant controls included in the random effects type models are significantly different from zero. NAFTA has a coefficient of 1.7 in the Mundlak corrected random effects estimator an indication that, NAFTA is associated with higher exports to the USA relative to the world. Holding all else constant, NAFTA is estimated to be 447.39% higher compared to non-NAFTA countries. Similarly, Latin American and Caribbean countries on average and holding all things constant significantly raise exports to the USA relative to the world. These are expected given the close proximity of NAFTA countries and to a large extent the Latin American and Caribbean countries to the USA. On the contrary, on average and holding all else constant, African exports to the USA are significantly lower relative to the rest of the world in the Mundlak regressions but positive in columns (9) and (10). In summarising, Table (3.3) indicates that AGOA and GSP preferences increase exports to the USA relative to the rest of the world holding all else constant. While CAFTA-DR decreases exports to the USA relative to the world.

For the CBTPA preferences, a positive coefficient is achieved only after controlling for annual variations in preferences through the inclusion of preferences and time interactions. In the case of AGOA, controlling for the annual variation in the preferences makes no difference to the sign or significance of the estimated coefficient. Also, the interaction of time and the preferences is significantly lower in 2008 and 2009 compared to the base years of AGOA (2001) and CBTPA (2000). An indication of the harm caused to exports of developing countries and the inability of the USA to absorb additional imports from the world as a result of the financial crisis of that period. In spite of this, the AGOA and CBTPA preferences on average and holding all things constant have been able to increase exports of developing countries to the USA relative to their exports to the rest of the world.

Turning our attention to the next table (Table (3.4)) we find qualitatively similar results. AGOA is positive and significant in both the Heckman and the *Poisson PMLE*. Similarly, the CBTPA preferences are only positive when the annual variation to the preference is controlled for. On the contrary, the GSP coefficient becomes negative in the *Poisson* model. They are however, significant in all models in which they appear within the table. In both tables the annual variation of the AGOA preferences indicates that the first few years of AGOA saw a rapid rise in exports to the USA relative to the rest of the world compared to the base year of 2001. Columns (1) and (4) report the first stage results for our Heckman estimator. All variables with the exception of the number of free lines, have a significant impact on the probability of exporting to the USA. Apart from countries that qualify for the CBI, all the remaining preferences, that is, GSP and AGOA eligible countries significantly lower the probability of exporting to the USA. A country's competitiveness (RCA) in a product and the preference margin significantly increases their probability of exporting to the USA. This is in line with our earlier assertion in the preceding section that, the larger the margin between the *MFN* tariff and the applied tariff (in this case the preferential tariff) the more likely a country would try to exploit the gains from exporting that particular product. Nonetheless to exploit these advantages, a country with a competitive advantage in production of product p is more likely to benefit from the higher preference margins by increasing its exports.

In column (4), latitude, English and Spanish speaking as well as land area significantly increase the probability of exporting to the USA holding all else constant. The remaining variables, number of cities, landlocked, Christianity and Muslim dummies (compared to the other religions) reduce the probability of exporting to the USA. The negative coefficients for the Muslim and Christian dummies might largely be due to the Chinese effect. However, for the Muslim dummy the composition of the exports of Muslim countries is also playing a role here. The military coefficient significantly lowers the probability of exporting to the USA. This is evidenced by the fact that, the USA normally imposes trade sanctions on countries it believes to be undemocratic or ruled by military leaders. The significance of military and the religious dummies indicate that they must be included in the first stage regression. They are thus highly correlated with the probability of exporting to the USA. In addition, all exclusion restrictions are jointly significant and different from zero. The case for military is however, much stronger than the religious dummies. The main difference between the two first stage regressions is that column (1) is based on a fixed effects regression, while column (4) is a Mundlak corrected random effects estimator—modified from that proposed by Jensen et al. (2002). Column (4) allows additional exclusion restrictions in the form of the religious dummies as well as additional controls provided by the time invariant variables.

In the second stage, we include the time and preference interactions in the immediate column after each first stage regression. The second column after the first stage estimates (columns (3) and (6)) exclude these interactions. The time-preference interactions only make a difference for the CBTPA in this table as previously shown in Table (3.3). The last two columns report the coefficients for the *Poisson PMLE*. The coefficients for the Poisson, in most cases are larger than the previous models discussed. However, the Poisson estimator's standard errors are lowest among all the models reported above. In most cases it is less than half the standard error of the other models—thus indicating that it provides the lowest variance among the estimators presented in this section. The standard errors of the Heckman are quite similar to those of the fixed effects in Table (3.3). This in turn indicates that our exclusion restrictions are reasonable. The Heckman second stage standard errors reported in Table (3.4) have not been corrected as has been suggested by for example Wooldridge (2002). The similar standard errors reported by both model types reduces the pressure of correcting the second stage errors reported and also leads us to believe that the standard errors are unbiased. This result can be attributed to the large sample dimension of our data and given that our estimators have large N and small T sample properties we can overlook the correction at this stage.

Given these comparisons, all models presented with the exception of the ordinary random effects estimator are consistent to a large extent. The ordinary random effects, however, has presented us with relatively larger coefficients—at times twice the estimated coefficients in the other models. This points to its inconsistency and inefficiency, hence the remaining models perform better in reducing this bias—in most cases the estimated coefficients and standard errors are the largest indicating an upward bias of the ordinary random effect estimates. An argument which we do not find tenable here is whether the model is misspecified and that the random effects is inappropriate. It does not seem so, since the Mundlak corrected random effects attenuates the bias of the ordinary random effects. The explanation could be the presence of a correlation between the random effects and some explanatory variables. Thus the inclusion of the averages of the explanatory variables as suggested by Mundlak (1978) has greatly reduced the misspecification and problems created by the assumption of no correlation. Nevertheless, the ρ reported by the random effects type estimators is significantly different from zero indicating that the random effects is preferred to a pooled OLS regression. In addition, the Breusch and Pagan LM tests of random effects indicate the presence of the random effects and these are significantly different from zero. Finally, the goodness of fit measures of the Mundlak corrected random effects are larger than those of the ordinary random and fixed effect estimators. As a result, the Mundlak random effects provides a better fit and is the more appropriate model to present in this section.

Table (3.5) shows the median and OLS regression of the time invariant variables on the fixed effects. Apart from the NAFTA coefficient the median regressions report lower coefficients compared to the OLS regression. In almost all cases there are no sign reversals. Comparing the coefficients to that of the Mundlak corrected random effects, it is observed that Spanish speaking, English speaking and African dummies are now positive in the fixed effect estimator. The NAFTA coefficient is smaller than that reported in Table (3.3). The first eight columns of Table (3.5) correspond to the first four columns of Table (3.3). The remaining four columns correspond to the Heckman second stage regression in Table (3.4). To sum up, the remaining coefficients have the same sign as the random effects but are marginally larger in most cases.

The final table reports results for a sub-sample of countries. In columns (1), (3) and (4) we exclude OECD and European countries from our sample leaving us with 119 countries. In columns (2), (5) and (6) China and Hong Kong are also excluded in addition to the countries excluded earlier. One reason for excluding these countries is that, they have large trade flows with the USA. China for one, has a trade surplus with the USA and supplies a significant volume of USA imports. Excluding these developed OECD and European countries, China and Hong Kong allows us to lessen their impact on our results. These provide us with further sensitivity and robustness checks. In addition, we want to show whether in the absence of China (which is competitive in similar products) the AGOA and CBTPA preferences show larger and more significant coefficients. The results are qualitatively similar to the ones reported earlier. The only difference is in the first stage regression, the GSP eligible country dummy is now positive. Indicating that in the absence of the more competitive OECD countries and China, there is a marginally higher probability of exporting under the GSP.

In the trade literature the inclusion of the zero export values provides the estimate for the extensive margin of exports (for example, Felbermayr and Kohler, 2006). By focussing on non-zero exports, we obtain the intensive margin estimates. Thus, our Poisson PMLE below can be considered as representing the extensive margin estimates. The Heckman second stage and the Mundlak corrected random effects provide the intensive margin estimates of the impact of the AGOA and CBTPA preferences. Notably, the extensive margin estimates are larger than the intensive margin estimates (cf. Cardamone, 2011; Cipollina and Salvatici, 2010b; Felbermayr and Kohler, 2006). Our result is in line with the literature mentioned above. Besides, Felbermayr and Kohler (2006) note that excluding the extensive margin can lead to biased estimates of the coefficient of interest[18].

[18]In Felbermayr and Kohler (2006) the coefficient of interest was a WTO dummy. In our case this would be the preference dummy.

Table 3.3: Fixed/Random effects regression without selection correction

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	log of imports by USA/log of imports by ROW									
	FE1	FE2	FE3	FE4	Mundlak1	Mundlak2	Mundlak3	Mundlak4	RE1	RE2
AGOA product dummy	0.324***	0.324***	0.384**	0.385**	0.456***	0.456***	0.417**	0.417**	0.818***	0.825***
	(0.076)	(0.076)	(0.135)	(0.135)	(0.076)	(0.076)	(0.136)	(0.136)	(0.140)	(0.140)
agoa×gsp product dummy	0.398	0.397	0.429	0.428	-0.013	-0.014	0.025	0.024	-0.074	-0.072
	(0.426)	(0.426)	(0.477)	(0.478)	(0.523)	(0.523)	(0.565)	(0.565)	(0.539)	(0.541)
CBTPA product dummy	-0.670***	-0.670***	0.367**	0.368**	-0.653***	-0.653***	0.394***	0.395***	1.218***	1.216***
	(0.075)	(0.075)	(0.113)	(0.113)	(0.075)	(0.075)	(0.113)	(0.113)	(0.111)	(0.111)
cbtpa×gsp product dummy	-1.098	-1.098	-1.115	-1.115	-1.548*	-1.548*	-1.559*	-1.559*	-1.219*	-1.218*
	(0.914)	(0.914)	(0.914)	(0.914)	(0.617)	(0.617)	(0.617)	(0.617)	(0.600)	(0.600)
GSP product dummy	0.113**	0.113**	0.113**	0.113**	0.125**	0.125**	0.126**	0.126**	0.180***	0.176***
	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.034)	(0.034)
CAFTA-DR	-0.505***	-0.505***	-0.242***	-0.243***	-0.483***	-0.483***	-0.222***	-0.222***	-0.141***	-0.145***
	(0.036)	(0.036)	(0.038)	(0.038)	(0.035)	(0.035)	(0.037)	(0.037)	(0.033)	(0.033)
Country's RCA, lagged (log)	0.105***	0.105***	0.100***	0.100***	0.114***	0.114***	0.108***	0.109***	0.117***	0.116***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Market size, USA.World (logs)	0.007***	0.007***	0.008***	0.008***	0.009***	0.009***	0.010***	0.010***	0.029***	0.029***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Military		-0.018^{+}		-0.020^{+}		-0.018^{+}		-0.020^{+}		-0.047***
		(0.010)		(0.010)		(0.010)		(0.010)		(0.007)
landlocked					0.078***	0.078***	0.078***	0.078***	0.060***	0.064***
					(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
Area (log)					-0.018***	-0.018***	-0.018***	-0.018***	-0.033***	-0.036***
					(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Number of cities					-0.002**	-0.002**	-0.002**	-0.002**	0.001^{+}	0.004***
					(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
latitude					-0.002***	-0.002***	-0.002***	-0.002***	-0.001***	-0.001***
					(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
English Speaking					-0.002	-0.002	-0.002	-0.002	-0.005	0.025**
					(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)
Spanish speaking					-0.126***	-0.126***	-0.125***	-0.125***	0.081***	0.112***
					(0.017)	(0.017)	(0.017)	(0.017)	(0.021)	(0.020)
Africa					-0.050***	-0.050***	-0.050***	-0.050***	0.068***	0.058***
					(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
Latin America & Caribbean					0.317***	0.317***	0.315***	0.315***	0.437***	0.479***
					(0.018)	(0.018)	(0.018)	(0.018)	(0.019)	(0.020)
NAFTA					1.699***	1.699***	1.700***	1.700***	1.499***	1.487***
					(0.044)	(0.044)	(0.044)	(0.044)	(0.045)	(0.045)
Majority Christian						-0.071***		-0.071***		-0.099***
						(0.009)		(0.009)		(0.009)
Majority Muslim						0.032***		0.032***		0.022**
						(0.008)		(0.008)		(0.008)
Constant	0.189***	0.191***	0.196***	0.198***	0.400***	0.400***	0.407***	0.407***	0.418***	0.427***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.023)	(0.023)	(0.023)	(0.023)	(0.025)	(0.024)
agoa×year$_i$			Yes	Yes			Yes	Yes	Yes	Yes
cbtpa×year$_j$			Yes	Yes			Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak average terms	No	No	No	No	Yes	Yes	Yes	Yes	No	No
Observations	1047124	1047124	1047124	1047124	1047124	1047124	1047124	1047124	1047124	1047124
Clusters	1.22e+05	1.22e+05	1.22e+05	1.22e+05	1.22e+05	1.22e+05	1.22e+05	1.22e+05	1.22e+05	1.22e+05
R-squared overall	0.000	0.000	0.001	0.001	0.154	0.154	0.156	0.156	0.090	0.092

Standard errors in parentheses, $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. (a) Dependent variable is the log of (imports into the US/into rest of world) (b) Estimation is done at 6 digits on positive flows. (d) F-tests of the Fixed effects are F-test(121776,925326) = 6.88 , F-test(121776,925325) = 6.88, F-test(121776,925308) = 6.88, F-test(121776,925308) = 6.88 for the first four columns respectively. (e) robust standard errors used (f) $a \times$ year$_i$ indicates an interaction term. In this case it is the interaction between variable a and a particular year i. i = 2002, ... , 2009; j = 2001, ... , 2009

Table 3.4: Heckman two step estimator

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	$X^{USA}=1$	log (USA/ ROW)		$X^{USA}=1$	log (USA/ ROW)			
	1st-stage	2nd-Stage A	2nd-Stage B	1st-stage	2nd-Stage A	2nd-Stage B	Poisson	Poisson
AGOA product dummy		0.407**	0.335***		0.405**	0.332***	0.508***	1.230***
		(0.134)	(0.075)		(0.134)	(0.075)	(0.004)	(0.008)
agoa$\times$gsp product dummy		0.395	0.365		0.392	0.362	1.196***	2.139***
		(0.464)	(0.414)		(0.462)	(0.412)	(0.142)	(0.142)
CBTPA product dummy		0.353**	-0.644***		0.358**	-0.638***	-0.587***	0.247***
		(0.112)	(0.074)		(0.112)	(0.074)	(0.002)	(0.003)
cbtpa$\times$gsp product dummy		-1.083	-1.066		-1.088	-1.071	-5.252***	-5.500***
		(0.888)	(0.887)		(0.886)	(0.885)	(0.415)	(0.415)
GSP product dummy		0.111**	0.110**		0.109**	0.109**	-0.943***	-0.873***
		(0.040)	(0.039)		(0.040)	(0.039)	(0.011)	(0.011)
CAFTA-DR		-0.265***	-0.514***		-0.266***	-0.516***	-1.598***	-1.147***
		(0.038)	(0.036)		(0.038)	(0.036)	(0.004)	(0.004)
Country's RCA, lagged (log)		0.000	0.002		0.003	0.006	0.303***	0.298***
		(0.005)	(0.005)		(0.005)	(0.005)	(0.000)	(0.000)
Market size, USA.World (logs)		0.009***	0.008***		0.009***	0.008***	0.260***	0.260***
		(0.001)	(0.001)		(0.001)	(0.001)	(0.000)	(0.000)
1st stage Residuals		-5.545***	-5.696***		-5.966***	-6.121***		
		(0.152)	(0.154)		(0.162)	(0.165)		
GSP LDC country dummy	-0.013***			-0.013***				
	(0.001)			(0.001)				
GSP country dummy	-0.008***			-0.008***				
	(0.001)			(0.001)				
CBI	0.039***			0.039***				
	(0.008)			(0.008)				
AGOA country dummy	-0.006***			-0.006***				
	(0.001)			(0.001)				
Country's RCA (log)	0.070***			0.070***				
	(0.001)			(0.001)				
Military	-0.009***			-0.009***				
	(0.001)			(0.001)				
Number of free lines	0.001			0.001				
	(0.001)			(0.001)				
Margin (MFN and applied tariff)	0.014***			0.014***				
	(0.001)			(0.001)				
Area (log)				0.031***				
				(0.000)				
Number of cities				-0.002***				
				(0.000)				
latitude				0.001***				
				(0.000)				
landlocked				-0.075***				
				(0.001)				
English Speaking				0.059***				
				(0.002)				
Spanish speaking				0.064***				
				(0.003)				
Majority Christian				-0.039***				
				(0.002)				
Majority Muslim				-0.101***				
				(0.002)				
Constant	0.141***	4.078***	4.178***	-0.090***	4.064***	4.157***		
	(0.001)	(0.105)	(0.106)	(0.003)	(0.104)	(0.105)		
agoa$\times$year$_i$		Yes			Yes			Yes
cbtpa$\times$year$_j$		Yes			Yes			Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak average terms	No	No	No	Yes	No	No	No	No
Observations	2279844	1047124	1047124	2279844	1047124	1047124	1704878	1704878
R^2	0.020	0.022	0.017		0.022	0.018		
Adjusted R^2	0.020	0.022	0.017		0.022	0.018		
Clusters	1.63e+05	1.22e+05	1.22e+05	1.63e+05	1.22e+05	1.22e+05		
rho	0.678	0.549	0.549	0.588	0.605	0.608		
F-Test	483.580	84.726	139.692		85.054	140.306		
R-squared overall	0.139	0.006	0.004	0.266	0.003	0.002		

Standard errors in parentheses, $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. (a) Dependent variable is the log of (imports into the US/into rest of world) (b) Estimation is done at 6 digits on positive flows (c) F-test of exclusion restrictions: F(3,162845)=45.34 and Chi-squared test $\chi^2(5) = 3150.25$ for columns (1) and (4) respectively. Column 1 uses fixed effects and the exclusion restriction does not include religion. Column 4 has religion (christian and muslim) as additional exclusion restrictions. The F-test (Chi-squared test) is a joint significance test of military, number of free lines, preference margin and religion dummies (where applicable) (d) robust standard errors used (except the Poisson case). i = 2002, ... , 2009; j = 2001, ... , 2009

Table 3.5: Regression of Time Invariant variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Dependent variable is estimated fixed effects											
	FE1-Median	FE1-OLS	FE2-Median	FE2-OLS	FE3-Median	FE3-OLS	FE4-Median	FE4-OLS	Heck1-Median	Heck1-OLS	Heck2-Median	Heck2-OLS
landlocked	0.000	0.056***	-0.000	0.058***	-0.000	0.057***	-0.000	0.059***	0.003**	0.051***	0.324***	0.403***
	(0.001)	(0.008)	(0.001)	(0.008)	(0.001)	(0.008)	(0.001)	(0.008)	(0.001)	(0.008)	(0.003)	(0.009)
Area (log)	0.000	-0.036***	-0.000	-0.038***	0.000**	-0.035***	0.000	-0.037***	0.007***	-0.023***	-0.100***	-0.128***
	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)	(0.001)	(0.002)
Number of cities	-0.000**	0.002*	0.000*	0.004***	-0.000***	0.002*	0.000	0.004***	-0.001***	0.001	0.009***	0.010***
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
latitude	-0.000***	-0.001***	-0.000***	-0.001***	-0.000***	-0.001***	-0.000***	-0.001***	-0.001***	-0.002***	-0.005***	-0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
English Speaking	0.002**	-0.010	0.003***	0.013	0.002**	-0.011	0.003***	0.011	-0.008***	-0.015	-0.304***	-0.295***
	(0.001)	(0.010)	(0.001)	(0.010)	(0.001)	(0.010)	(0.001)	(0.010)	(0.001)	(0.010)	(0.004)	(0.010)
Spanish speaking	0.019***	0.157***	0.022***	0.182***	0.011***	0.134***	0.014***	0.159***	0.086***	0.187***	-0.379***	-0.307***
	(0.001)	(0.021)	(0.001)	(0.021)	(0.001)	(0.021)	(0.001)	(0.021)	(0.002)	(0.021)	(0.006)	(0.021)
Africa	0.007***	0.074***	0.010***	0.063***	0.006***	0.069***	0.009***	0.059***	0.045***	0.104***	0.576***	0.592***
	(0.001)	(0.009)	(0.001)	(0.009)	(0.001)	(0.009)	(0.001)	(0.009)	(0.001)	(0.009)	(0.004)	(0.010)
Latin America & Caribbean	0.036***	0.410***	0.042***	0.442***	0.033***	0.403***	0.038***	0.434***	-0.027***	0.361***	0.547***	0.860***
	(0.001)	(0.019)	(0.001)	(0.020)	(0.001)	(0.019)	(0.001)	(0.020)	(0.001)	(0.019)	(0.005)	(0.019)
NAFTA	1.519***	1.508***	1.515***	1.503***	1.526***	1.522***	1.523***	1.517***	1.555***	1.559***	1.070***	1.187***
	(0.002)	(0.047)	(0.002)	(0.047)	(0.002)	(0.047)	(0.002)	(0.047)	(0.003)	(0.047)	(0.011)	(0.046)
Majority Christian			-0.013***	-0.082***			-0.014***	-0.081***				
			(0.001)	(0.009)			(0.001)	(0.009)				
Majority Muslim			-0.002*	0.011			-0.002**	0.010				
			(0.001)	(0.008)			(0.001)	(0.008)				
Constant	-0.267***	0.276***	-0.265***	0.291***	-0.268***	0.277***	-0.266***	0.291***	-0.267***	0.157***	0.967***	1.353***
	(0.001)	(0.028)	(0.001)	(0.027)	(0.001)	(0.028)	(0.001)	(0.027)	(0.002)	(0.027)	(0.007)	(0.028)
Observations	121777	121777	121777	121777	121777	121777	121777	121777	121777	121777	121777	121777
$Pseudo R^2/R^2$	0.033	0.077	0.034	0.078	0.033	0.075	0.034	0.076	0.04	0.074	0.173	0.156
Adjusted R^2		0.077		0.078		0.075		0.076		0.074		0.156
F-Test		544.900		515.980		530.479		504.561		548.228		1959.238

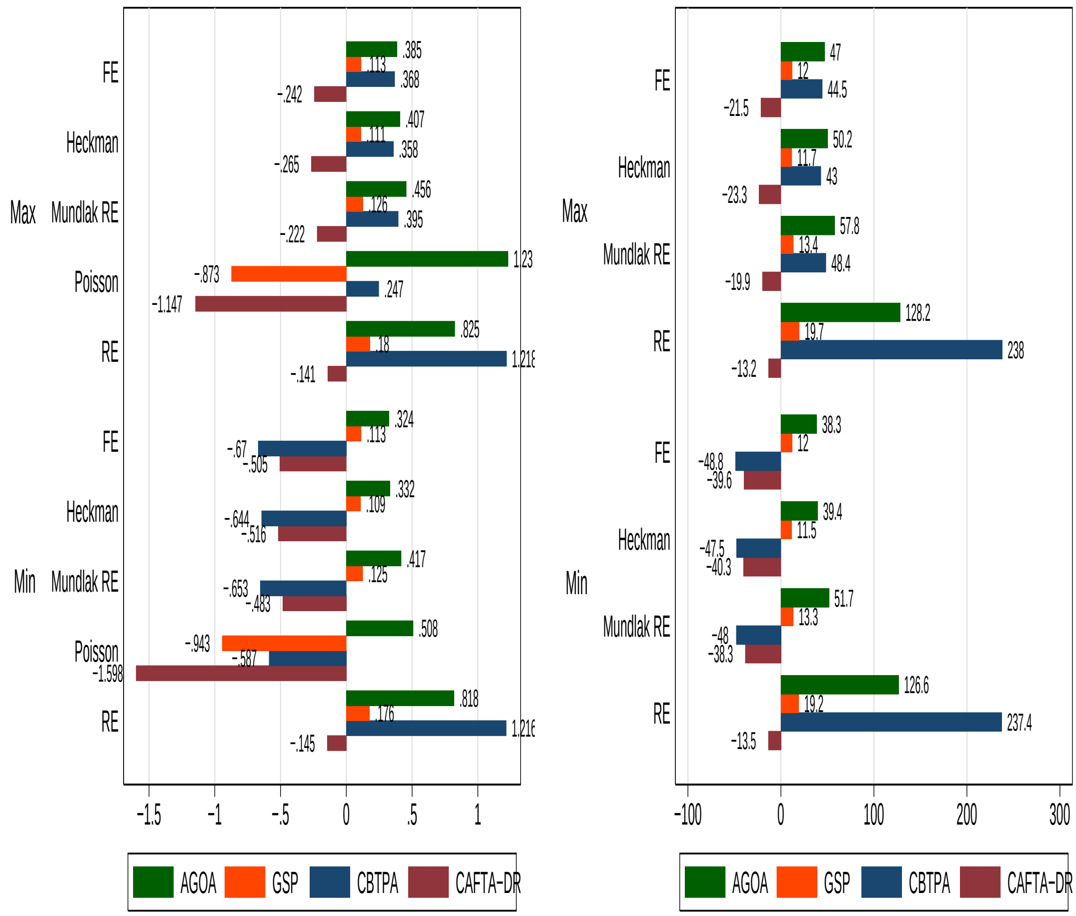
Robust Standard errors in parentheses (excluding median regressions), $^{+}\ p < 0.1$, $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$. (a) Dependent variable is the estimated fixed effects from the panel regression (b) Estimation is done at 6 digits on positive flows (c) Pseudo R^2 is Calculated as $1 - \frac{minimised\ sum\ of\ absolute\ deviations}{raw\ sum\ of\ absolute\ deviations}$ for median regressions. (d) FE*i* and Heck*i* are based on the fixed effects extracting from the models in the previous table with similar column headings.

Table 3.6: Random effects without selection correction and Heckman two step estimates for sub-sample of countries

	(1)	(2)	(3)	(4)	(5)	(6)
	log (USA/ ROW)		$X^{USA} = 1$	log (USA/ ROW)	$X^{USA} = 1$	log (USA/ ROW)
	Mundlak-RE[1]	Mundlak-RE[2]	LPM[1]	2nd Stage[1]	LPM[2]	2nd Stage[2]
AGOA product dummy	0.409^{**}	0.410^{**}		0.395^{**}		0.391^{**}
	(0.136)	(0.136)		(0.133)		(0.133)
agoa$\times$gsp product dummy	-0.079	-0.096		0.354		0.351
	(0.578)	(0.581)		(0.450)		(0.450)
CBTPA product dummy	0.397^{***}	0.400^{***}		0.350^{**}		0.350^{**}
	(0.113)	(0.113)		(0.111)		(0.111)
cbtpa$\times$gsp product dummy	-1.616^{**}	-1.623^{**}		-1.046		-1.044
	(0.552)	(0.539)		(0.872)		(0.871)
GSP product dummy	0.147^{**}	0.149^{**}		0.122^{*}		0.122^{*}
	(0.048)	(0.048)		(0.048)		(0.048)
CAFTA-DR	-0.167^{***}	-0.159^{***}		-0.191^{***}		-0.187^{***}
	(0.037)	(0.037)		(0.037)		(0.037)
Country's RCA, lagged (log)	0.156^{***}	0.159^{***}		0.022^{***}		0.022^{***}
	(0.008)	(0.008)		(0.007)		(0.007)
Market size, USA.World (logs)	0.007^{***}	0.007^{***}		0.008^{***}		0.007^{***}
	(0.001)	(0.001)		(0.001)		(0.001)
Military			-0.009^{***}		-0.009^{***}	
			(0.001)		(0.001)	
landlocked	0.142^{***}	0.138^{***}	-0.085^{***}		-0.078^{***}	
	(0.011)	(0.011)	(0.001)		(0.001)	
Area (log)	-0.040^{***}	-0.038^{***}	0.020^{***}		0.016^{***}	
	(0.002)	(0.002)	(0.000)		(0.000)	
Number of cities	0.007^{***}	0.005^{***}	-0.002^{***}		-0.002^{***}	
	(0.001)	(0.001)	(0.000)		(0.000)	
latitude	0.001^{**}	0.001^{***}	-0.000^{+}		-0.000^{***}	
	(0.000)	(0.000)	(0.000)		(0.000)	
English Speaking	-0.022^{+}	0.005	0.030^{***}		0.021^{***}	
	(0.011)	(0.012)	(0.002)		(0.001)	
Spanish speaking	-0.098^{***}	-0.068^{**}	0.048^{***}		0.045^{***}	
	(0.022)	(0.023)	(0.003)		(0.003)	
Africa	-0.094^{***}	-0.103^{***}				
	(0.009)	(0.009)				
Latin America & Caribbean	0.227^{***}	0.202^{***}				
	(0.020)	(0.020)				
GSP LDC country dummy			-0.011^{***}		-0.010^{***}	
			(0.001)		(0.001)	
GSP country dummy			0.003^{***}		0.002^{**}	
			(0.001)		(0.001)	
CBI			0.032^{***}		0.032^{***}	
			(0.008)		(0.008)	
AGOA country dummy			-0.007^{***}		-0.006^{***}	
			(0.001)		(0.001)	
Country's RCA (log)			0.074^{***}		0.074^{***}	
			(0.001)		(0.001)	
Number of free lines			0.000		0.001	
			(0.001)		(0.001)	
Margin (MFN and applied tariff)			0.018^{***}		0.017^{***}	
			(0.001)		(0.001)	
1st stage residuals				-7.542^{***}		-7.596^{***}
				(0.209)		(0.212)
Constant	0.398^{***}	0.413^{***}	-0.059^{***}	5.383^{***}	-0.049^{***}	5.505^{***}
	(0.027)	(0.028)	(0.003)	(0.140)	(0.003)	(0.144)
agoa$\times$year$_i$	Yes	Yes		Yes		Yes
cbtpa$\times$year$_j$	Yes	Yes		Yes		Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak terms (averages)	Yes	Yes	Yes	No	Yes	No
Observations	565077	538946	1634346	565077	1606878	538946
R^2				0.032		0.032
Adjusted R^2				0.032		0.032
Clusters	78716	76762	1.17e+05	78716	1.15e+05	76762
rho	0.338	0.326	0.544	0.560	0.536	0.544
F-Test				74.980		74.123
R-squared overall	0.143	0.143	0.260	0.010	0.241	0.013

Standard errors in parentheses, $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (a) Dependent variable is the log of (imports into the US/into rest of world) and for the 1st Stage it is the probability of exporting to the USA (b) Estimation is done at 6 digits on positive flows, (c) [1] Excludes 33 OECD countries and remaining European countries, [2] China and Hong Kong are also excluded in addition to the OECD and European countries. (d) Test of random effects is 226101.89 and 217337.84 for the first two columns respectively (e) Chi-squared test of exclusion restrictions are $\chi^2(3) = 227.92$ and $\chi^2(3) = 204.48$ for columns (3) and (5) respectively. i = 2002, ... , 2009; j = 2001, ... , 2009

In order to make the comparison across the models we summarise the coefficients and the exponentiated coefficients of the dummies of the models in Figure (3.3). The minimum and maximum coefficients are reported for each model and for the AGOA, GSP, CBTPA and CAFTA-DR preferences. The noticeable difference is the ordinary random effects and the Poisson coefficients. The remaining models have quite similar coefficients. The graph on the right side (panel b) reports the exponentiated coefficients of the non Poisson estimators. We do this since our dependent variable is in logs and the explanatory variable is a dummy. We thus report the percentage impact of the preferences. The analysis above points towards the tendency of the USA preferences in increasing the exports of its preference beneficiaries relative to their exports to the rest of the world.



(a) β (b) $(\exp(\beta) - 1) \times 100$

The minimum and maximum coefficient estimates in the tables in the main text are shown in the graph. The graph on the left shows the coefficient estimates while the graph on the right is based on the exponentiated coefficient values.

Figure 3.3: Summary of coefficients and impact of preference dummies in tables 3.3, 3.4 & 3.6

Various attempts at testing the robustness and sensitivity of the estimates also lend support to the conclusion above. Thus, the maximum impact of AGOA, GSP and CBTPA is 57.8%, 13.4%, and 48.4% respectively ignoring the results from the ordinary random effects. Similarly, the minimum impact is 38.3%, 11.5% and -48.8% respectively. The CAFTA-DR impact is negative in all models—the magnitude of the impact is 40.3% in absolute terms. The negative estimate is probably due to the choice of products and the exclusion of fuel products. Further, we might be capturing the adjustment phase for these countries as they move from the CBTPA preferences to fully take advantage of the new free trade arrangement. On the whole, the AGOA estimates are much smaller than Collier and Venables (2007) but quite close to Frazer and Van Biesebroeck (2010). A comparison in this case is quite difficult since Collier and Venables (2007) uses more aggregated data while Frazer and Van Biesebroeck (2010) uses all HS 6 digit products.

Figure (3.4) below summarises the results of the HS-2 and 4 digit products in tables (B.4)–(B.7) in appendix (B)[19]. The Heckman, fixed effects and Mundlak coefficients are qualitatively similar

[19] All HS-6 digit products are included in the aggregated regressions. Two approaches were used, (1) the proportion of

across the tables. Panels (a), (c) and (e) provide a summary of the coefficient estimates while panels (b), (d) and (f) provide the percentage impact. Of the four preferences, the GSP preferences are not significant in any of the six panels. The AGOA product dummy is significant in the HS-2 digit estimations. The CAFTA-DR preferences are significant in all cases except for the 4 digit non-apparel products. In particular, the AGOA product coefficients switch signs across the 2 and 4 digit aggregation levels. The coefficient estimate of 3.2–3.6 in panels (a) and (b) become -0.02–(-)0.13 at the HS-4 digit level (although the HS-4 digit coefficients are not significant). This switching of signs, probably reveals that, there are compositional effects within each product category due to the preferences offered—and these are driving the results shown in the figure. Aiello et al. (2010, 18) for instance, note that at the HS-2 digit level, "... the margin of trade preferences widely varies across sectors and donors." We would probably add that, this also varies across the type of preferences offered in the case of a single preference giving country. From the results, this variation across the HS-2, 4, and 6 digit products are different in the case of the AGOA products. The preferences at the 6-digit level combine fewer HS-8 digit products for each HS-6 product compared to the HS-2 and 4 digit products—since tariffs are set at the 8-digit level or higher. Thus, the number of products within a level of aggregation offered preferences increase as we choose HS-4 and 2 digit products.

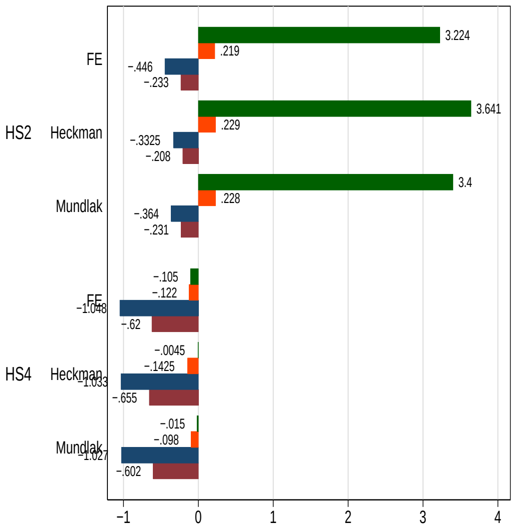
The large positive impact at the 2-digit level picks up the increase in exports for a larger number of aggregated 8-digit products that have been provided the AGOA preferences. This accumulation of preferences at the 2-digit level drives up the gains we observe for the AGOA countries. The 4-digit level surprisingly does not pick up the accumulated gains from summing up the 8-digit products at the 4-digit level. The key differences could therefore be the composition of the products and the concentration of the preferences and possibly the gains within each particular HS-2 and 4-digit cluster. The composition and concentration of preferences and the gains could therefore be quite different across the two levels of aggregation. However, by combining or amalgamating these products into one HS-2 category—the potential increase in exports becomes larger and translates into the large positive coefficients observed in the graph. These compositional efffects are more apparent in the AGOA products compared to the remaining products and tend to be driven by the preferences offered under the apparel and textile products. Given the choice of non-apparel products, this compositional effect does not reverse the signs across the HS-2 and HS-4 digit products—possibly due to the absence of any compositional effect. The similarity and strength of the results in panels (a)–(d), lends support to the contention that, the presence of apparel and textile products in our sample is driving the observed gains for AGOA.

The HS-6 digit products probably have fewer or no compositional effects due to all 8-digit products having been provided preferential tariffs (or at least half the number of HS-8 products for a particular HS-6 digit product). Further, most HS-6 digit products can be broken down into a handful of products at the HS-8 digit level. Thus, selecting these products at the HS-8 (or even 10 digit) level leaves us with little or no compositional effects of the preferential tariff. This is a likely explanation for the similar signs the HS-6 and HS-2 digit products have. In other words, the compositional effects at the lower level of aggregation increases the magnitude of the impact

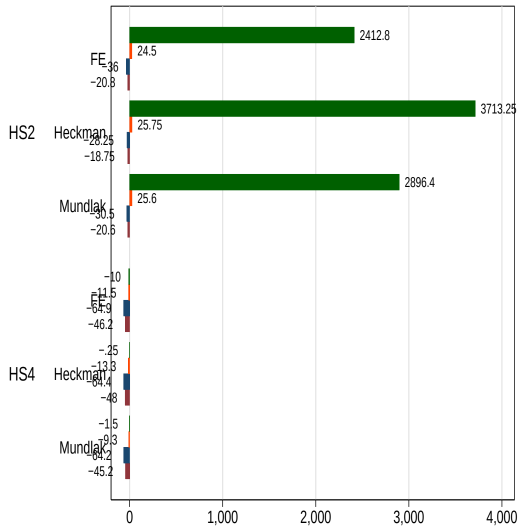
HS-6 digit products having AGOA tariffs and (2) the proportion was converted to a dummy—=1 if proportion is 0.4 and higher, = 0 otherwise. Both results were similar. The results reported are based on the approach (2)—the dummy variable.

while the absence of the effect at the HS-6 digit level provides marginal to reasonable gains in exports. The remaining preferences however, do not show sign reversals thereby indicating that the compositional effects do not play any role in the impact of these preferences. On the contrary, the CBTPA preference also show evidence of the compositional effect for apparel and textiles. We must note that, the apparel and textile preferences offered to the Caribbean Basin countries are similar to the AGOA preferences. However, the impact is positive and significant at the HS-4 digit level while it is negative and insignificant at the HS-2 digit level of aggregation. Two conclusions obtained from the foregoing are that, (1) the choice of products and (2) the level of aggregation of the products matter for the framework used in analysing the impact of AGOA in this chapter. The result is further indication that the benefits of AGOA are concentrated in particular broad categories of products—namely, fuels and apparel and textile products. The exclusion of fuel products only serves to place more emphasis on the apparel and textile gains. Thus, the gains observed in figure (3.4) are largely driven by the apparel and textile products and the compositional effects within the apparel and textile products.

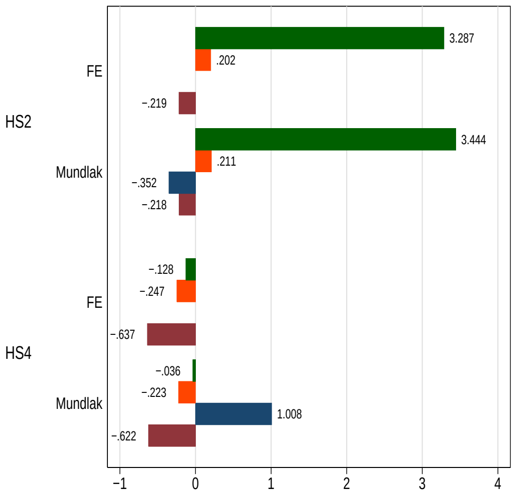
We have presented results of various models to show the impact of USA's preferences on developing countries. In doing this, we have controlled for the exports of these countries to the rest of the world to isolate the impact of the preferences. The results after various robustness and sensitivity checks point to a positive impact of AGOA and the CBTPA preferences of the USA on the exports of its beneficiaries to the USA. Nonetheless, the USAs GSP preference is also increasing exports to the USA relative to the rest of the world.



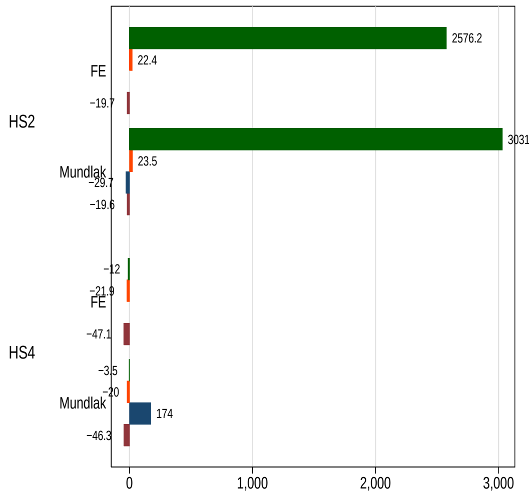
(a) β: All products



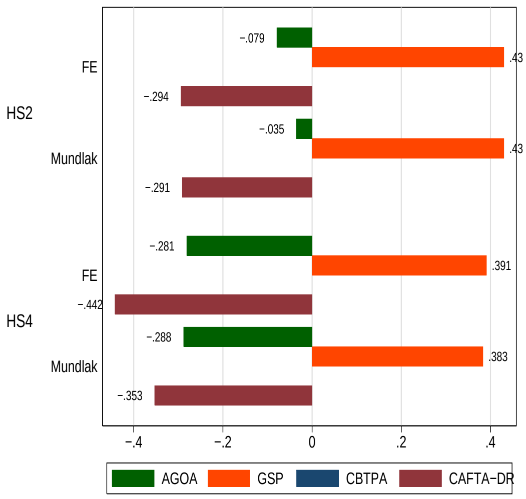
(b) $(\exp(\beta) - 1) \times 100$: All products



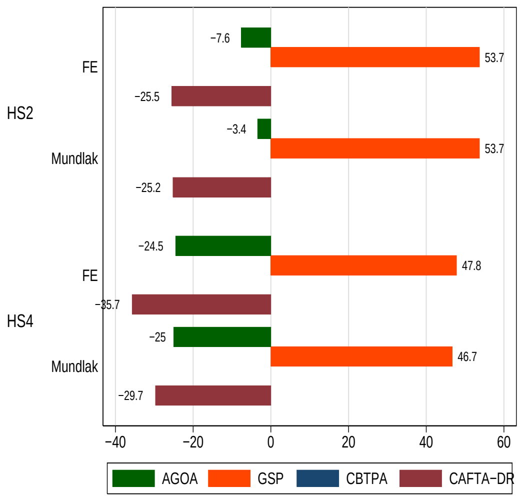
(c) β: Apparel & Textiles



(d) $(\exp(\beta) - 1) \times 100$: Apparel & Textiles



(e) β: Non-Apparel



(f) $(\exp(\beta) - 1) \times 100$:Non Apparel

The minimum and maximum coefficient estimates in the tables in the appendix to this chapter are shown in the graph. The graphs on the left show the coefficient estimates while the graphs on the right are based on the exponentiated coefficient values. The top row is based on the full sample of product, the graphs in the middle region are based on the apparel and textile products and the bottom graphs are based on the non-apparel and textile products in the sample of products.

Figure 3.4: Summary of coefficients and impact of preference dummies in tables B.4 – B.7

3.5 Summary and conclusion

In this chapter, we have estimated the impact of the USA's AGOA and CBTPA preferences on its beneficiary countries. Adopting Collier and Venables (2007) methodology and making the required changes to fit their methodology within our framework. Unlike the AGOA preference that remains positive whether the AGOA product and year interaction is included or excluded as additional regressors—the CBTPA product dummy switches signs. The CBTPA preference is therefore sensitive to the exclusion of the interaction of the CBTPA product and year dummies. The inclusion of the CBTPA and year dummies controls for the annual modifications of the preference. Therefore the exclusion of these additional regressors lead to a negative impact of the CBTPA product dummy. However, after adjusting for the annual modifications, we find that, the impact is positive and significant. The AGOA preference on the other hand is not sensitive and is robust to the exclusion of the AGOA preference-time interaction as well as the exclusion of some variables. HS-6 and HS-2 levels of disaggregation tend to provide consistent estimates with the same signs and significance. The HS-4 disaggregation on the other hand, tends to be sensitive and the signs switch around a lot. However, at higher levels of aggregation (HS-2) the explanatory variables tend to be correlated with each other, especially the preference-time interactions and the CBTPA preferences—thus, we find it difficult to obtain a coefficient estimate of the CBTPA preferences in a few cases. Also, with the non apparel and textile regression, correlation among the variables is higher and the concentration of exports in this cluster is relatively smaller.

Adverse weather and market demand shocks can affect the exports of the preference beneficiaries. Secondly, there have been several modifications of the preferences for both CBTPA and AGOA countries. For instance, five CBTPA members exited in 2006 to form a free trade agreement with the USA. In terms of AGOA, Côte d'Ivoire (2005), Central African Republic (2004), and Eritrea (2004) have at one time or the other been declared ineligible for AGOA. Mauritania on the other hand has on two occasions had their membership of AGOA withdrawn (in 2006 & 2009). These changes in the membership of the preferences and modification of the products offered have implications on exports that must be controlled. The product dummies in the regressions are defined for countries that maintain their preference eligibility. This provides additional variation in the regression—the dummy captures not only the membership of the countries in a particular preference but also whether their exports of that product received preferential tariffs. Controlling for these using time dummies and their interaction with the preference enables the preferential impact to be identified. On the contrary, failing to control for these events might influence and possibly reduce the estimated coefficient. For instance, the effect of controlling for these events is visible in the case of the CBTPA countries whereby the negative coefficient becomes positive after including the time dummies and its interaction with the preference.

For AGOA, the coefficient remains positive and only the size of the impact varies marginally. The marginal change in the AGOA impact implies that, these countries have not had drastic market supply shocks aside from the initial uptake of AGOA. Besides, modifications of the preferences have been minor and centred mainly around apparel and textile products. The CBTPA countries on the other hand have encountered major changes in their preferences over the period and the exclusion of five countries that were major exporters under the CBTPA must have led to significant changes in their exports. Notwithstanding, the region has had its fair share of natural disasters (such as hurricanes and floods) that have hit Haiti and a few other Caribbean countries after 2000.

Using the ordinary random effects leads to inconsistent estimates which in several cases are twice the estimates of the fixed effects, Mundlak corrected random effects and Heckman selection estimators. The Poisson PMLE estimates are also larger but they report much smaller standard errors affirming its popularity in the current trade literature as an applied model of choice. The inclusion of preference-time interactions increases the impact of the preferences. The increase is smaller in the other non Poisson estimators—but quite larger—more than twice the estimate for the Poisson estimator. The Mundlak corrected random and fixed effects estimates are quite similar to the Heckman indicating that these models are good alternatives to the Heckman estimator. An implication, is that non exporting is distributed randomly in our dataset. Thus, the estimated coefficients in the absence of controlling for selection are not as severely biased as expected.

Studies based solely on the ordinary random effects as shown by our analysis tend to overestimate the impact of the preferences. Increasing the sample size and allowing N to increase infinitely does not resolve this inconsistency. However, the differences between the fixed effects, Mundlak corrected random effects and Heckman selection estimators are not so different in very large samples. This holds because our sample is relatively large and with fixed T—thus consistency holds for increasing N. Thus for fixed T but large N the differences in estimates are quite small as the benefits of the large sample tends to lead us towards the true parameter estimates. In smaller N samples however, care needs to be taken in choosing the appropriate estimator to obtain consistent estimates.

In concluding, we note that further work needs to be done in identifying the causal impact of the preferences. Extensions to this chapter to overcome the present short-comings include exploring causality issues within the regression framework and possibly extending the analysis to a structural gravity model. Further, the use of the preference margin in the first stage of the Heckman two step regression would need to be revisited to determine whether it would be more appropriate in determining the outcome in the second stage. However, if the preference margin is used in the second stage, the product level dummies and their interaction with the year dummies would have to be excluded from the regression. This is mainly due to the correlation between the preference dummies and the margin—they essentially capture similar policy effects. Last but not the least, we avoided the debate on the correct measurement of the preference margin. We note that, the literature in this area has grown and that Fugazza and Nicita (2013) for example, recommend that the relative preference margin should be the appropriate margin used in the gravity model[20]. Future work in this area would have to take this debate into account. At the moment, our argument for not pursuing the relative preference margin is that, the preference margin is only included in the first stage of the Heckman estimator in this chapter. All the remaining regressions use the dummy approach instead. Again, future work in this area can be used to determine whether the measurement of the preference margin leads to a significant difference in the results presented above. In the next two chapters (chapters 4 & 5) we focus on AGOA and pursue a matching and quantile analysis.

[20]Examples of the literature in this area, include, Carrère (2011); Carrère et al. (2010); Fugazza and Nicita (2013); Hoekman and Nicita (2011); Low et al. (2009).

Chapter 4

Impact of AGOA: A matching approach

4.1 Introduction

The current chapter departs from the previous chapter (chapter 3) by adopting a matching approach to analysing the impact of AGOA. This chapter attempts to fit within the body of literature by analysing the impact of AGOA on exports of recipient countries to the USA by constructing a counter-factual set of countries using a propensity score matching approach. Methodologically, it departs from the standard linear and non linear regression framework by constructing counter-factual outcomes to determine the impact of the preferences. This is useful since any comparison would be on countries that are similar to the AGOA beneficiaries. Nevertheless, matching reduces the heterogeneity of the sample of countries in the present chapter, although the sample remaining does not become fully homogeneous. In other words, the analysis compares similar rather than different countries hence the reduction in the heterogeneous nature of the sample of countries. Matching provides the tools to find a similar country to each treated country based on a set of covariates. Removing some of the heterogeneity and using the restricted sample thus allows a cleaner estimate of the impact of the preference. This might explain the large variation in the impact of AGOA that is reported within the literature. The large sample in addition exaggerates the impact of AGOA–mainly due to the large number of countries within the sample that are quite different in terms of social, economic, cultural and religious characteristics compared to the AGOA recipients.

In terms of the matching methodology two other papers Millimet and Tchernis (2009) and Baier and Bergstrand (2009b) have used this approach in answering a different set of questions. Baier and Bergstrand (2009b) applied the approach to study the impact of free trade agreements on trade flows. They find an impact quite close to the estimates provided by gravity models. Millimet and Tchernis (2009) on the other hand, provide two different applications (1) an assessment of the environmental impact of WTO membership and (2) the impact of the euro adoption on bilateral trade. For both applications they do find evidence to support the positive impact on the outcomes of interest, that is, being a member of the WTO is beneficial in terms of global environmental measures pursued by member countries. The adoption of the euro increased trade among developed countries (Millimet and Tchernis, 2009). The novelty of the current chapter is that, the method is adopted in answering questions related to the impact of AGOA on recipient countries which to the knowledge of the author is the first attempt of this type of analysis.

The main question asked in this chapter is, "*has AGOA increased the exports of recipients* *compared to non-recipient countries*?" Our contribution in this chapter, is the careful construction of the counter-factual outcomes for assessing the impact of AGOA. The construction of the counter-factual is done using three methods, (1) propensity score matching (PSM), (2) exact covariate matching, (3) synthetic control methods (SCM). The rest of the chapter is organised as follows. Section 4.2, presents the data and econometric approach. Section 4.3, discusses the results. Finally, Section 4.4 concludes.

4.2 Econometric approach and data

4.2.1 Matching framework

The matching approach is expected to provide a causal explanation to whatever increases in exports of AGOA countries is observed. Since one does not observe what the exports of these countries would be after the enactment of AGOA, countries that were not provided these preferences are used as the counter–factual. The assumption is that, these countries provide the trend in exports that, would have been observed for the preference beneficiaries. Thus, after matching—a positive estimate would imply that the AGOA preference has contributed to higher exports for AGOA countries compared to the counter-factual. One can therefore attribute this difference, to the AGOA status of the recipients. However, if there is no difference in exports, then the preferences might not have been the main instrument in the export performance of the beneficiaries. Matching is done on similar economic, political, cultural and other factors in order to limit the influence of these characteristics in driving the results.

Randomisation as noted by Lee (2005) is difficult to undertake. Observational (or secondary) data on countries are not randomised and thus treated (AGOA countries) and control (non AGOA countries) groups may vary significantly in terms of their characteristics. This difference can be removed by the use of matching as argued in for example Lee (2005). Lee (2005) notes that the outcome y_i is uncorrelated with the treatment in cases of randomised experimental data. This condition might hold if the treatment is exogenous and for reasons unrelated to y_i (Lee, 2005). Examples could be a new law or regulation or due to natural events for example the weather or geography (Lee, 2005). Since the AGOA policy was a new law, this motivates the choice of approach here[1].

As discussed in the literature on matching—comparing groups of treated individuals and controls where there is no randomisation leads to biases (Guo and Fraser, 2010; Lee, 2005; Rosenbaum, 1987, 1991a, 2002, 2004, 2010; Rosenbaum and Rubin, 1983b). Some expected problems from the matching procedure include dimension problems—where the treated and controls differ in characteristics and do not fall within the region of common support—that is, where the treated and controls fail to overlap in their propensity scores (Lee, 2005). Propensity score matching helps solve the dimension problem while the common support problem is solved by having the propensity score lie between zero and one (Guo and Fraser, 2010; Rosenbaum and Rubin, 1983b).

For our purposes, the treatment is the exogenous policy provided by the USA for selected

[1]The AGOA treatment for ROW and EU is strictly exogenous given that, the law was passed by the USA and not ROW or EU. Our main argument for exogeneity in the case of exports to the USA is that it was a law passed by the American congress and not by the African countries.

SSA countries. The AGOA preference thus becomes the treatment. The outcome of interest is the exports of the beneficiaries in terms of their exports to the USA. We define this in various ways to test the sensitivity and robustness of the outcome. The outcome of interest in this case is discussed below.

The analysis is carried out on both the shares as well as the levels of exports to each destination. Total exports are considered for the three destinations[2] as $X^i_{\text{world}} = \sum_{k=1}^{K} \sum_{j=1}^{J-2} X^{ijk}_{\text{ROW}} + \sum_{k=1}^{K} X^{ik}_{\text{USA}} + \sum_{k=1}^{K} X^{ik}_{\text{EU}}$

1. Export shares: Exports to the USA out of total exports for country i $\left(\frac{X^i_{\text{USA}}}{X^i_{\text{world}}}\right)$
2. Exports in levels
   (a) Total exports to the USA for country i $\left(\sum_{k=1}^{K} X^{ik}_{\text{USA}}\right)$
   (b) Difference between year n and 1997 for country i

$$\left(\sum_{k=1}^{K} X^{ik}_{\text{USA},n}\right) - \left(\sum_{k=1}^{K} X^{ik}_{\text{USA,1997}}\right),$$

where n = 2002, 2005, 2007, 2010

In the analysis, we use mirror exports instead of the reported exports for each outcome. The reason for using mirror exports is that, these are recorded more accurately than the exports reported by developing countries.

The following equations lay out the challenges of defining a counter-factual for the AGOA countries. The four equations provide the process we undertake to match the AGOA countries—taken as the treated and the control countries—the countries that have not been provided the AGOA treatment.

$$\tau_{ATE} = E(\tau) = E[y^1 - y^0] \tag{4.1}$$

$$\tau_{ATT} = E[\tau|X=1] = E[y^1 - y^0|X=1] = E[y^1|z, X=1] - E[y^0|z, X=1] \tag{4.2}$$

$$\hat{P(z)} = Pr(X=1|z) \tag{4.3}$$

$$\tau_{i,j} = \text{arg min } |\hat{P}^1_i - \hat{P}^0_j| \quad i \in T, j \in C \tag{4.4}$$

$$\text{superscripts, (agoa)} = \begin{cases} 1 & \text{if} \quad \text{agoa beneficiary} \\ 0 & \qquad \text{otherwise} \end{cases}$$

Where: X is the AGOA treatment, τ is the treatment effect coefficient, y is the outcome and z - is a vector of variables used in estimating the propensity score for matching AGOA beneficiaries to non-AGOA developing countries. This vector includes economic variables, political variables, country characteristics and other variables such as landlocked, physical capital per worker, land per worker among others. T and C are treated and control country sets respectively.

[2]The same exercise was carried out for exports to the USA within the various preferences offered by the USA. These do not yield any new results and as expected AGOA countries export less under the GSP and MFN relative to the other countries. Given that for most of the control countries their preferential exports outside the GSP was close to zero we did not expect any surprising results.

Equation (4.1 & 4.2) define the problem at hand, We seek to find the difference between the outcome before and after the treatment. However, it is difficult to observe $E[y^0|z, X = 1]$ — the counter-factual. Hence, the counter-factual is constructed by selecting countries with characteristics similar to the treated countries — $E[y^0|z, X = 1] = E[y^0|z, X = 0]$. The countries are matched based on the vector z—allowing one to select countries that are very similar prior to the treatment. When matching is done properly it allows for a causal inference to be made (Yasar and Rejesus, 2005). This allows a comparison to be made and thus any difference in the outcome can be attributed to the preference.

The vector y^1 is the outcome for the treated group (AGOA beneficiaries) and y^0 is that of the control group created (that is, the counter-factual for the AGOA group of countries). Equation (4.3) is the propensity score in general form estimated conditional on the vector of characteristics. This is estimated via a logit regression and the predictions from this regression becomes the propensity score used for matching AGOA recipients to non-AGOA countries. Equation (4.4) specifies that treated countries with a propensity score ($P\hat{(z)}$) close to a control country are matched together—as they are similar, based on the covariates chosen.

In matching, it is often difficult obtaining a match. In order to avoid this problem, one could match countries based on the propensity score using the *nearest neighbour*, *caliper/radius*, *kernel*, and *stratification* matching methods. As is common in practise, a combination of the various methods are employed to check the sensitivity and robustness of the estimated treatment effects. In the nearest neighbour matching, preference beneficiaries and non preference beneficiaries are randomly ordered and the non preference beneficiaries with the score closest to the beneficiary is selected. The nearest neighbour finds the nearest control country to match with a treated country. Matching can be one-one or one-many, that is either one control to each treated unit or more than one control to each treated unit. In addition, a control can be matched to a treated unit more than once—matching with replacement (Caliendo and Kopeinig, 2008; Guo and Fraser, 2010; Khandker et al., 2010).

The nearest neighbour matching estimated in the next section is done without replacement and a one-one nearest neighbour matching is performed. The nearest neighbour (NN) is given by

$$NN = \min |\hat{P}_i^1 - \hat{P}_j^0| \quad i \in T, j \in C,$$

In addition, to using the propensity score with the nearest neighbour, the mahalanobis metric matching (NN_{maha}) discussed at length in Abadie et al. (2001); Abadie and Imbens (2002, 2011) and Rosenbaum and Rubin (1985) is also included as a check on the propensity score matching estimates. This estimator is a distance estimator and it uses the covariance matrix COV of the matching variables to match the treated and control countries.

$$NN_{\text{maha}} = (z_i - z_j)' COV^{-1} (z_i - z_j) \quad i \in T, j \in C,$$

The control country with the minimum distance NN_{maha} is chosen for the treated country. Again, matching is done without replacement and both treated and control countries matched are excluded from the data after the match. Abadie et al. (2001); Abadie and Imbens (2011) and Abadie and Imbens (2002) point out that one problem with this approach is that in finite samples there is a bias of order $O_p(N^{-\frac{1}{k}})$ when continuous covariates are used (where k is the number of continuous covariates). The bias results from the differences in the continuous covariate values between treated and control groups (Abadie et al., 2001; Abadie and Imbens, 2002, 2011). The bias-corrected estimator reduces the bias but does not entirely eliminate it thereby making it $\sqrt{N}$ consistent (Abadie and Imbens, 2002, 2011). A bias of order $O_p(N^{-\frac{1}{6}})$ to $O_p(N^{-\frac{1}{9}})$ is expected in this analysis. The use of the bias-correction based on the matching variables used in the regression would be useful in reducing most of this bias. Furthermore, as a robustness check, Abadie and Imbens's (2011) heteroscedasticity consistent matching estimator is reported in the appendix. This is useful in cases where the treatment is heterogeneous and standard errors are heteroscedastic. It is important to note that the NN_{maha} estimator is not based on the propensity score but rather the estimator conducts the matches based on the covariates specified that enter the covariance matrix, COV. This allows us to further ascertain the robustness of the propensity score method in estimating the impact of AGOA.

The *caliper/radius* matching on the contrary, requires us to define a region of *common support*—(δ) and randomly select non preference beneficiaries that have a similar propensity score within the defined region. This improves on the quality of matches obtained (Guo and Fraser, 2010; Lee, 2005). The nearest neighbour in some cases can match treated and control countries that have very different propensity scores (Guo and Fraser, 2010; Lee, 2005). The caliper, therefore provides the opportunity to place a threshold on the difference in propensity scores between the treated and controls that are matched (Guo and Fraser, 2010; Lee, 2005). We experiment with calipers in the region of 0.2, 0.1 and 0.05 to check the sensitivity of the results to the caliper chosen. The *caliper* match is given as, $\delta > |\hat{P_i^1} - \hat{P_j^0}| = arg\ min\ |\hat{P_i^1} - \hat{P_j^0}| \quad i \in T, j \in C$, where $\hat{P_i^0}$ and $\hat{P_j^1}$ are the estimated propensity scores of the controls and treated respectively. The caliper choice is informed by Rosenbaum and Rubin's (1985) suggestion for choosing a *caliper* size that reduces a large percentage of the bias. According to Rosenbaum and Rubin (1985), the suggested *caliper* size is given by $0.1 \times (s_1^2/s_0^2) \times \sqrt{[(s_1^2 + s_0^2)/2]}$ where s_1^2, s_0^2 are the sample variances for treated and control countries respectively.

Bandwidth parameters of 0.2, 0.1 and 0.06 are used for the kernel estimator. Again, varying the bandwidth allows one to check the sensitivity and robustness of the kernel matching estimates to the size of the bandwidth. The kernel matching is given by

$$\kappa = \frac{k\left(\frac{\hat{P}_j^0 - \hat{P}_i^j}{a_n}\right)}{\sum_{l \in C} k\left(\frac{\hat{P}_k^0 - \hat{P}_i^1}{a_n}\right)} \quad j \in C, i \in T$$

$k(\cdot)$ is the kernel function. The Epanechnikov kernel is used in all kernel estimations in section (4.3.1). The kernel matching estimator uses a weighted average of the control group of countries to construct each treated country's counter-factual.

Last but not the least, stratification matching allows the propensity score to be divided into strata (or blocks/intervals). The mean difference between the treated and control countries are then calculated within each strata (Caliendo and Kopeinig, 2008; Khandker et al., 2010). After which, the overall weighted mean is calculated over all strata to obtain the *ATT* estimate.

To strengthen our conclusions, a difference-in-difference matching estimation is carried out.

This is possible since observations of the outcome variable before and after the inception of AGOA are available. It is thus possible to use the difference in outcomes to calculate the *ATT* estimate. This is given by

$$\tau_{ATT}^{DID} = E[\Delta y^1|X = 1, \hat{P(z)}] - E[\Delta y^0|X = 0, \hat{P(z)}]$$

where $\Delta y^1 = y^1_{before} - y^1_{after}$ and $\Delta y^0 = y^0_{before} - y^0_{after}$. y^1_{before} and y^0_{before} is taken as the year 1997 for treated and control outcomes respectively. y^1_{after} and y^0_{after} are outcomes for the treated and control countries for 2002, 2005 and 2010.

Differences due to individual characteristics lead to overt bias and differences in the unobservables (ϵ) give rise to hidden (covert) biases (Lee, 2005). Overt and hidden biases can affect the treatment effects. Guo and Fraser (2010) and Lee (2005) note that overt biases can easily be controlled and removed by incorporating z covariates in the estimation of the propensity score. On the other hand, hidden (covert) biases are more difficult to remove and control for (Guo and Fraser, 2010; Lee, 2005). Overt biases occur when $E(y|X = 1) \neq E(y|X = 0)$ due to some differences in the z covariates while differences in ϵ leads to hidden biases (Guo and Fraser, 2010; Lee, 2005; Rosenbaum, 1987, 1991a, 2002, 2004, 2010). The difference-in-differences matching estimator above is helpful in reducing the hidden biases present[3].

Equation (4.2) can be rewritten as

$$E[y^1|X = 1, z] - E[y^0|X = 0, z] = \tau_{ATT} + (E[y^0|X = 1, z] - E[y^0|X = 0, z])$$

To identify τ_{ATT} within the framework the second term (in brackets) must be equal to zero, that is $E[y^0|X = 1, z] - E[y^0|X = 0, z] = 0$. If $E[y^0|X = 1, z] - E[y^0|X = 0, z] \neq 0$, then the *ATT* estimate would be biased due to differences in the treated and control group of countries (Caliendo and Kopeinig, 2008)—leading to *selection bias*. In order for the *ATT* estimate to be identified the following two assumptions suggested by Rosenbaum and Rubin (1983b) is important for identifying our AGOA treatment impact.

- *Unconfoundedness:* $y^0, y^1 \coprod X|z$. The outcomes are assumed to be independent of the AGOA treatment after controlling for observed covariates. This assumption is plausible since the policy is exogenous—the preference is extended to SSA countries by the USA.

- *Overlap:* $0 < \hat{P}(X = 1|z) < 1$. The propensity score for the treated and controls must lie between zero and one. In other words, their distributions must have a considerable overlap.

Caliendo and Kopeinig (2008) argue that in estimating τ_{ATT}, the weaker versions of the assumptions above can be used. Thus, unconfoundedness of the controls ($y^0 \coprod X|z$) and the propensity score less than one ($\hat{P}(X = 1|z) < 1$) are enough for identification .

The presence of *selection bias* is a problem expected in the analysis. Controlling for the covariates in the propensity score estimate would solve the selection bias that occurs due to covariate differences. On the other hand, the bias arising from unobserved factors is more difficult to resolve and can still lead to highly biased estimates. Using a difference-in-difference matching estimator is an attempt at reducing the problem. However, the literature suggests carrying out sensitivity tests to check for problems with unobserved factors. Two of these tests are Rosenbaum's

[3]Even though this estimator is useful in removing hidden biases, it might not entirely eliminate them.

bounds analysis (DiPrete and Gangl, 2004; Rosenbaum, 1987, 1991a, 2010, 2012; Rosenbaum and Rubin, 1983a) and Ichino et al. (2006) and Nannicini's (2007) sensitivity design. Ichino et al.'s (2006) tests are carried out in the chapter (see tables 4.15 & 4.16).

Given that our data is in longitudinal form, this would create problems when matching. This has been noted by Nielsen and Sheffield (2009) and refer to it as the, *"double dimensionality of panel data"*. They also discuss some of the ways in which researchers have attempted to get around the problem. To circumvent this problem we average our pre- and post-treatment outcomes and perform our matching on the average pre-treatment characteristics (or covariates) as well as using the difference between our chosen base year (1997) and selected post-AGOA periods. The choice of 1997 as the base year is because the treated countries in 1997 had no idea that AGOA would be implemented. It therefore provides a reasonable time period before the start of the programme and thus, there is no unanticipated rise in exports in expectation of the AGOA programme.

4.2.2 Data

Data is obtained from several sources. Data for the outcomes are obtained from the UN-Comtrade database and the United States International Trade Commission (USITC)[4]. The World Development Indicators and IMF's International Financial Statistics databases provide macroeconomic indicators (such as, gross domestic product, inflation, population, value-added (in industry, manufacturing, agriculture, construction, services, etc), interest rates, exchange rates among others) for the purposes of matching similar countries. Additionally, Kaufmann's Global Governance[5], Database of Political Institutions[6], Polity IV and Bates et al (2005)[7] databases provide political, cultural and religious data to augment the vector of control variables needed to perform a good match. Finally, gravity type variables are obtained from the CEPII gravity database [8].

The data consists of a cross-section of 42 treated countries from SSA and approximately 122 potential control countries (developing countries in Asia, Latin America and the Caribbean as well as North Africa). After matching, the number of control countries included in the estimation drops to 34 countries—giving us a total of 76 countries for the matching estimators. Table (C.5) in the appendix shows the number of treated and control countries falling within each block of the propensity score as well as the overall number of treated and control countries matched. The outcomes are averaged over the period 2001–2010 while the variables used in the propensity score and exact mahalonobis matching are averaged over the 1990–1999 period.

4.3 Results and discussion

The propensity score is based on the 1990 – 1999 averages of the social, economic, cultural and religious control variables. The matches are then performed on the average of the post–AGOA

[4]dataweb.usitc.gov/

[5]www.worldbank.org/wbi/governance/

[6]Thorsten Beck, George Clarke, Alberto Groff, Philip Keefer, and Patrick Walsh, 2001. "New tools in comparative political economy: The Database of Political Institutions." 15:1, 165-176 (September), World Bank Economic Review.

[7]Robert Bates ; Karen Feree; James Habyarimana; Macartan Humphreys ; Smita Singh, "Other Political Data (updated 2005)", http://hdl.handle.net/1902.1/14977 UNF:5:XzsUmjt4AZzpm9JB3hO6pA== Murray Research Archive [Distributor] V1 [Version]

[8]http://www.cepii.fr/anglaisgraph/bdd/gravity.asp

data (2001–2010). We define our treated countries in four different ways, (i) All AGOA: all AGOA countries irrespective of whether their participation in AGOA has been revoked at least once; (ii) In & Out AGOA: The set of countries that have had the AGOA preferences revoked at least once (or restored after a previous revocation), these include countries such as Mauritania, Madagascar, Niger, Côte d'Ivoire among other countries; (iii) Always AGOA: The set of countries that have never had their preferences revoked since the inception of the programme or when they were officially assigned to the programme. This is limited to countries that were provided AGOA preferences between 2000 and 2003; and (iv) AGOA & EBA: Countries having AGOA and EBA preferences simultaneously and have at least consistently had AGOA preferences throughout the study period. These various definitions allows us to study any differences that might be observed across the various treated groups. At the same time it allows us to see whether these would result in compositional effects that might affect how the impact is reported. Furthermore, it would be possible to observe whether countries simultaneously exporting under the AGOA and EBA programmes export less to the USA compared to the counter-factual (or control) countries.

The propensity score estimates and information on the performance of the propensity score are summarised in the appendix. The overlap assumption mentioned earlier in this chapter is satisfied—since our propensity score lies between zero and one (see figure [C.2] in appendix C). It is also safe to assume that the unconfoundedness assumption is satisfied—given that the AGOA preference is exogenous. Last but not the least, the tests of covariate balance after the propensity score estimation shows that the covariate means for the treated and control are not statistically different. In other words, the t-tests for the null hypothesis that the covariate means are the same for the control and treated countries cannot be rejected for each covariate included in the propensity score estimation (see table [C.6] in the appendix)—implying that the differences in the covariate means prior to estimating the propensity score has been reduced. In the next section we focus on presenting the results from the matching estimations performed on the data.

4.3.1 Propensity score matching

Tables (4.1)–(4.8) are the initial matching results based on the four definitions of the treatment group above. For each odd numbered table the outcomes studied are (a) total exports to the USA; (b) the share of USA exports in total exports of each country; and (c) the difference between exports in a given year (2002, 2005, 2007 & 2010) and export in 1997. The even numbered tables show the results for eight product groups. The outcome is measured in levels. The product groups are based on Hanson's (2010) classification of eight different product categories these are:

- Agriculture, meat and dairy, & seafood (AMDS): HS 1–10, 12–14
- Food, beverages, tobacco, wood, & paper (FBTWP): HS 11, 15–24, 44–48
- Extractive industries (EI): HS 25–27, 68–71
- Chemicals, plastics, & rubber (CPR): HS 28–36, 38–40
- Textiles, apparel, leather, & footwear (TALF): HS41–42, 50–65
- Iron, steel, and other metals (ISOM): HS 26, 72–83

- Machinery, electronics, & transportation equipment (METE): HS 84–89
- Other industries (OI): HS 37, 43, 49, 66–67, 90–97

In all the tables in this section, the radius, kernel and stratification matching estimators are reported. The calipers (δ) chosen for the radius matching estimator are 0.05, 0.1 and 0.2 while the bandwidths (κ) for the kernel are 0.06, 0.1 and 0.2. The results in table (4.1) for all AGOA recipients for the outcomes in levels and shares are not significant. Significant estimates are, however, reported for the 2002 export difference. These are significant at the 5% level for the radius matching with caliper sizes 0.1 and 0.2 and the kernel with bandwidth of 0.2. The remaining radius and kernel estimates are significant at 10%. The significant results imply that, all things equal and on average, the difference in exports between 2002 and 1997 is less relative to the control countries. An indication that the control countries had a larger increase in exports to the USA over the period compared to the increase over the period for the treated countries. The relative difference is between \$ 361 and \$ 486.4 million[9]. On the contrary, widening the gap between the base year and our chosen year of interest shows no significant differences. Much of the significant difference is relatively close to the programme adoption year. The non-significance of the remaining outcomes provides no information about the relative differences between the controls and the treated countries contrary to our expectations. An implication is that for these outcomes, the treated and the control countries have similar levels or shares of exports.

In table (4.2) we find significant coefficients for all estimated impacts for TALF products. The estimates are negative and significant in all seven columns. The impact ranges from \$ -577.2 – \$ -817.5 million. The negative estimates indicate that the treated countries on average and *ceteris paribus* exported lower TALF products compared to the control countries. The result provides a causal impact of the preference on the treated countries. Comparing the TALF exports to our constructed counter-factual yields a lower impact of the preference. We note that, the TALF products include other products such as leather and footwear. The inclusion of these products which are not part of the AGOA special textile preferences might be contributing to the negative estimates. These additional products in which the AGOA countries are less competitive in, compared to the counter-factual countries are driving the results.

The AMDS products are also significant in the first six columns. The estimates are negative and range between \$ -119.3 million – \$ -1.4 billion. Thus, the AGOA countries on average and *ceteris paribus* have \$ 119.3 million to \$ 1.4 billion less exports compared to the counter-factual countries. The remaining products showing significant coefficients include FBTWP (column 4), METE (column 4 & 7) and OI (column 4 & 7) exports. The AGOA countries export \$ 96.5 million FBTWP products lower than the counter-factual countries on average and *ceteris paribus*. The estimate for METE and OI are approximately \$ 390 and \$ 109 million. Again, these products do not seem to be major export products of the treated countries. We do not find any significant results for the extractive industry. One possible explanation for this result, is that, the inclusion of other extractive products that are not crude oil related products have contributed to the insignificant estimate in this case. A closer look at the estimates indicates that they are positive despite being insignificant. The inclusion of non-oil products in this category has therefore contributed to the

[9] All dollar (\$) amounts referred to in this chapter and the next is based on the USA currency.

result—that is, no statistical difference in the exports of the product cluster. The remaining product clusters are also not significant and have negative estimates. These products are also not key exports of the treated countries.

Focussing on only the set of countries that have had a revocation of their preferences during the period yields a few more significant estimates (see table 4.3). We note that, the matching estimates reported do not include the remaining AGOA countries in the set of controls but maintains the earlier set of controls that are comparable to the new definition of treated countries (this is similar for the remaining tables in this section). Given that for this set of countries they spend at least one year out of the programme the negative estimates are well within our expectations. Nonetheless, given that the matching is based on averages of the outcomes over the period, these estimates average out the transition years. In the next chapter where a panel of the countries are analysed over time, this issue is resolved with year dummies. The treated countries export less to the USA relative to the controls. This ranges between \$ 1.63 billion and \$ 1.73 billion on average and all things equal. The radius estimates ($\delta = 0.2$) is significant for all four outcomes estimating the difference in exports with our 1997 base year. The difference increases with the gap in years. The relative difference ranges from \$ 463.2 million in 2002 to \$ 2.2 billion for 2010, on average and *ceteris paribus*. All things equal, the treated countries have experienced a smaller increase in exports over the period compared to the control countries. Essentially, the rise in exports during the period is much greater for the control relative to the treated.

Table (4.4) provides the estimates for the product clusters for countries that have not consistently maintained their AGOA status. TALF exports are significant and negative in two columns. All remaining products are not significant. TALF exports in columns (4) and (7) indicate that this group of AGOA countries exported \$ 1 billion less exports compared to the counter-factual countries all things equal. The results in the table can be explained by the inconsistency of the exports of the treated countries to the USA. Furthermore, our estimates are probably not clearly identified. The group of countries studied in the table receive the treatment multiple times and this may contribute to our estimate not being clearly identified and estimated. However, this result provides a comparison to the remaining tables in terms of how the various groups of treated AGOA countries fare.

Tables (4.5) and (4.6) present the results for countries that have consistently maintained their AGOA status. The results in table (4.5) is similar to table (4.1). The only outcome showing significant results is the export difference in 2002. This difference ranges from \$ 378.6 million to \$ 535.7 million, on average and all things equal. The remaining outcomes—exports (in levels and shares) and the remaining export differences are not significant. Earlier we attributed these to the crowding-out effects occurring at the country and product cluster levels. These effects are leading to the insignificant estimates observed. The significant 2002 difference-in-difference estimate implies that, the treated countries on average have not been able to increase their exports beyond that of the counter-factual. The mix of countries having very high exports on the one hand and the countries with very low to almost zero exports to the USA among the treated countries have contributed to the negative short-term impact of the AGOA preference. Our quantile analysis in the next section, attempts to disentangle these effects and to show the impact of the preference at the various quantiles of the export distribution. This way, we should be able to overcome the crowding-out effect prevalent in the results presented in this section.

Table (4.6) provides estimates for the case where the treated countries always maintain their AGOA status. AMDS, FBTWP, CPR, TALF and OI products provide a few significant results. The estimated difference between the treated and counter-factual countries range from \$ -103.9 million (OI products) to \$ -776.7 million (TALF products). Again, the estimated product clusters include several products that are not key exports of the AGOA countries and thus contribute to the significant and negative results observed. Nonetheless, the extractive industry remains insignificant and positive.

The final two tables (tables 4.7 & 4.8) exploring the propensity score matching estimates are for the countries that have AGOA and EBA preferences simultaneously. The export difference in 2002 is negative and significant at 5% in the radius ($\delta = 0.2$) and kernel ($\kappa = 0.2$) columns. The estimates for total exports to the USA is also significant at the 10% level in these two columns. The results for total exports to the USA indicate that, on average and all things equal total exports to the USA are \$ 1.20 billion to \$ 1.28 billion less than the control countries. Similarly, the increase in exports between 1997 and 2002 is lower than that of the controls by approximately \$ 410.7 million to \$ 440.8 million, *ceteris paribus*. Arguably, the fact that, these countries have the EBA preferences which competes with the tariffs offered under AGOA explains why we observe these results. Of note is that, the EBA was provided to these countries at the time AGOA was provided for the treated countries.

The final product table, table (4.8) for the countries having both 'AGOA & EBA' preferences provides some significant estimates for three products, AMDS, TALF and OI. The TALF exports are \$ 776 million less than the counter-factual countries on average and all things equal. This estimate is similar to that of table (4.6). AMDS are \$ 97 million to \$ 115 million lower for the treated countries while OI products are \$ 90 million less than the counter-factual countries, all things equal. The remaining products are not significant and have similar signs to those of the previous tables. We note once again, that EI exports are positive despite not being significant.

In summary, the explanation we can provide for the matching estimates is that given that our analysis is based on the mean values of exports for the period 2000 – 2010, we obtain long term results. The long term results being negative imply that the short-run impact immediately after the provision of AGOA are not maintained throughout the period. One conclusion of the above results is that, there is no long run positive impact of the AGOA preference. We explore these results further by applying a different approach to answering the question of what the causal impact has been for the AGOA countries. The new approach provides both short- and long-run impacts of the AGOA preference. Moreover, this approach allows us to focus on each AGOA country separately rather than combining all countries together. This case study type of analysis provides us with further evidence and allows us to make a more comparative and focussed analysis of the AGOA impact. Before turning our attention to the comparative case studies we check the robustness of the results presented here using the covariate/exact matching approach.

Table 4.1: Matching estimates: All AGOA

Outcome	Radius ($\delta = 0.05$)	Radius ($\delta = 0.1$)	Radius ($\delta = 0.2$)	Kernel ($\kappa = 0.06$)	Kernel ($\kappa = 0.1$)	Kernel ($\kappa = 0.2$)	Stratification
Exports	-892 000	-873 800	-1 155 000	-826 300	-713 400	-1 146 000	-671 600
Std. Error	1 219 000	941 400	925 800	1 134 000	934 100	947 100	948 700
Z-statistic	-0.732	-0.928	-1.248	-0.729	-0.764	-1.210	-0.708
# Control	34	34	34	34	34	34	34
# AGOA	42	42	42	42	42	42	42
Export Share	0.039	0.018	-0.003	0.029	0.023	-0.003	0.022
Std. Error	0.045	0.043	0.048	0.044	0.042	0.048	0.043
Z-statistic	0.871	0.408	-0.065	0.670	0.587	-0.051	0.507
# Control	34	34	34	34	34	34	34
# AGOA	42	42	42	42	42	42	42
Exports (2002 - 1997)	-388 500	-400 000	-486 400	-375 300	-361 600	-481 900	
Std. Error	236 300	196 800	196 900	220 300	195 700	198 400	
Z-statistic	-1.644*	-2.033**	-2.470**	-1.704*	-1.848*	-2.429**	
# Control	33	33	33	33	33	33	
# AGOA	37	37	37	37	37	37	
Exports (2005 - 1997)	-48 189.7	-178 900	-376 700	-92 494.5	-86 675.8	-360 200	
Std. Error	911 200	712 300	674 800	834 000	719 300	686 700	
Z-statistic	-0.053	-0.251	-0.558	-0.111	-0.121	-0.525	
# Control	33	33	33	33	33	33	
# AGOA	37	37	37	37	37	37	
Exports (2007 - 1997)	-21 524.9	-193 700	-459 100	-109 600	-84 129.7	-440 000	
Std. Error	1 394 000	1 077 000	1 007 000	1 278 000	1 104 000	1 027 000	
Z-statistic	-0.015	-0.180	-0.456	-0.086	-0.076	-0.428	
# Control	33	33	33	33	33	33	
# AGOA	37	37	37	37	37	37	
Exports (2010 - 1997)	-454 500	-555 900	-846 600	-563 800	-474 200	-843 900	
Std. Error	1 713 000	1 266 000	1 178 000	1 570 000	1 332 000	1 204 000	
Z-statistic	-0.265	-0.439	-0.719	-0.359	-0.356	-0.701	
# Control	33	33	33	33	33	33	
# AGOA	37	37	37	37	37	37	

All standard errors are bootstrapped with 250 replications. Covariates used in matching include proxies for governance (corruption), economic structure, gravity type variables. Critical Z-values are $Z(\alpha = 0.05) = 1.96$ and $Z(\alpha = 0.1) = 1.64$ for the 5% and 10% significance levels respectively for the Radius and Kernel matching estimates. The Stratification estimates are based on the Student's t distribution—the critical values for the 10% and 5% $t_{0.1,70} = 1.667$ and $t_{0.05,70} = 1.994$ are respectively. Note that: ATT estimate and standard errors for levels are in thousands of US \$. ** 5%, * 10%

Table 4.2: Matching estimates—Product exports: All AGOA

Outcome	Radius ($\delta = 0.05$)	Radius ($\delta = 0.1$)	Radius ($\delta = 0.2$)	Kernel ($\kappa = 0.06$)	Kernel ($\kappa = 0.1$)	Kernel ($\kappa = 0.2$)	Stratification
USA AMDS	-125 500	-126 600	-143 100	-119 300	-111 700	-1 411 000	-127 300
Std. Error	84 239.9	71 894.2	68 743.7	78 703.7	66 072.2	70 075.5	78 374.8
Z-statistic	-1.490	-1.761*	-2.082**	-1.516	-1.691*	-2.014**	-1.624
# Control	34	34	34	34	34	34	34
# AGOA	42	42	42	42	42	42	42
USA FBTWP	-30 062.8	-61 628.8	-96 596.5	-26 458.3	-36 084.4	-86 739.7	-53 286.4
Std. Error	39 130.1	44 994.3	57 345.3	36 144	33 118.9	53 593.5	46 636.2
Z-statistic	-0.768	-1.370	-1.684*	-0.732	-1.090	-1.618	-1.143
# Control	34	34	34	34	34	34	34
# AGOA	39	39	39	39	39	39	42
USA EI	471 100	580 200	556 800	49 3400	544 700	542 500	448 700
Std. Error	833 500	659 800	618 800	747 500	670 400	627 100	722 900
Z-statistic	0.565	0.879	0.900	0.660	0.813	0.865	0.621
# Control	32	32	32	32	32	32	34
# AGOA	42	42	42	42	42	42	42
USA CPR	-87 476.5	-79 539.8	-95 668.3	-82 940	-73 830.6	-97 676.5	-63 211.3
Std. Error	93 750.3	66 271	61 709.3	89 770.8	70 148.5	65 796	50 965.3
Z-statistic	-0.933	-1.200	-1.550	-0.924	-1.052	-1.485	-1.240
# Control	34	34	34	34	34	34	34
# AGOA	41	41	41	41	41	41	42
USA TALF	-668 000	-677 900	-811 600	-726 700	-652 600	-817 500	-577 200
Std. Error	378 300	332 300	331 300	382 000	344 100	349 200	335 000
Z-statistic	-1.766*	-2.040**	-2.450**	-1.902*	-1.897*	-2.341**	-1.723*
# Control	34	34	34	34	34	34	34
# AGOA	42	42	42	42	42	42	42
USA ISOM	-68 454	-72 318	-104 000	-64 905.7	-54 918.9	-98 839.3	-72 084.2
Std. Error	93 811.2	73 054.1	76 088.5	83 767.7	65 867.3	75 474.9	78 448.9
Z-statistic	-0.730	-0.990	-1.366	-0.775	-0.834	-1.310	-0.919
# Control	33	33	33	33	33	33	34
# AGOA	40	40	40	40	40	40	42
USA METE	-334 600	-371 800	-391 700	-266 700	-274 200	-386 400	-183 000
Std. Error	253 200	286 400	226 700	202 500	222 300	226 600	164 200
Z-statistic	-1.321	-1.298	-1.728*	-1.317	-1.233	-1.705*	-1.114
# Control	34	34	34	34	34	34	34
# AGOA	42	42	42	42	42	42	42
USA OI	-109 500	-99 626	-109 100	-96 356.5	-92 633.4	-107 600	-77 108
Std. Error	78 485.8	63 764.5	61 235.8	71 632.3	63 963.2	62 147.4	74 434.5
Z-statistic	-1.395	-1.562	-1.782*	-1.345	-1.448	-1.731*	-1.036
# Control	34	34	34	34	34	34	34
# AGOA	42	42	42	42	42	42	42

All standard errors are bootstrapped with 250 replications. Covariates used in matching include proxies for governance (corruption), economic structure, gravity type variables. Critical Z-values are $Z(\alpha = 0.05) = 1.96$ and $Z(\alpha = 0.1) = 1.64$ for the 5% and 10% significance levels respectively for the Radius and Kernel matching estimates. The Stratification estimates are based on the Student's t distribution—the critical values for the 10% and 5% $t_{0.1,70} = 1.667$ and $t_{0.05,70} = 1.994$ are respectively. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97). Note that: ATT estimate and standard errors are in thousands of US \$. ** 5%, * 10%

Table 4.3: Matching estimates: In & Out AGOA

Outcome	Radius ($\delta = 0.05$)	Radius ($\delta = 0.1$)	Radius ($\delta = 0.2$)	Kernel ($\kappa = 0.06$)	Kernel ($\kappa = 0.1$)	Kernel ($\kappa = 0.2$)	Stratification
Exports	-1 084 000	-1 281 000	-1 733 000	-1 225 000	-1 144 000	-1 627 000	-1 110 000
Std. Error	1 189 000	1 070 000	954 400	1 132 000	1 083 000	1 009 000	944 800
Z-statistic	-0.912	-1.197	-1.816*	-1.082	-1.056	-1.612	-1.175
# Control	32	32	32	32	32	32	10
# AGOA	10	10	10	10	10	10	9
Export Share	-0.013	-0.043	-0.069	-0.011	-0.027	-0.063	-0.041
Std. Error	0.067	0.059	0.059	0.066	0.058	0.058	0.061
Z-statistic	-0.190	-0.725	-1.163	-0.166	-0.459	-1.082	-0.680
# Control	32	32	32	32	32	32	10
# AGOA	10	10	10	10	10	10	9
Exports (2002 - 1997)	-312 000	-383 800	-463 200	-338 500	-343 800	-444 900	
Std. Error	307 900	286 500	228 700	311 300	295 000	237 100	
Z-statistic	-1.013	-1.340	-2.025**	-1.087	-1.165	-1.876*	
# Control	31	31	31	31	31	31	
# AGOA	10	10	10	10	10	10	
Exports (2005 - 1997)	-727 600	-909 600	-1 032 000	-819 200	-818 700	-1 023 000	
Std. Error	983 300	875 400	656 400	994 700	909 000	700 300	
Z-statistic	-0.740	-1.039	-1.572	-0.824	-0.901	-1.461	
# Control	31	31	31	31	31	31	
# AGOA	10	10	10	10	10	10	
Exports (2007 - 1997)	-1 340 000	-1 601 000	-1 726 000	-1 493 000	-1 462 000	-1 733 000	
Std. Error	1 530 000	14 09 000	1 031 000	1 557 000	1 461 000	1 105 000	
Z-statistic	-0.876	-1.136	-1.674*	-0.959	-1.001	-1.568	
# Control	31	31	31	31	31	31	
# AGOA	10	10	10	10	10	10	
Exports (2010 - 1997)	-1 781 000	-209 6000	-2 200 000	-2 011 000	-1 919 000	-2 246 000	
Std. Error	2 185 000	1 988 000	1 431 000	2 224 000	2 063 000	1 546 000	
Z-statistic	-0.815	-1.054	-1.537	-0.904	-0.930	-1.453	
# Control	31	31	31	31	31	31	
# AGOA	10	10	10	10	10	10	

All standard errors are bootstrapped with 250 replications. Covariates used in matching include proxies for governance (corruption), economic structure, gravity type variables. Critical Z-values are $Z(\alpha = 0.05) = 1.96$ and $Z(\alpha = 0.1) = 1.64$ for the 5% and 10% significance levels respectively for the Radius and Kernel matching estimates. The Stratification estimates are based on the Student's t distribution—the critical values for the 10% and 5% $t_{0.1,19} = 1.729$; $t_{0.1,40} = 1.684$ and $t_{0.05,19} = 2.093$; $t_{0.05,40} = 2.021$ are respectively. Note that: ATT estimate and standard errors for levels are in thousands of US $. ** 5%, * 10%

Table 4.4: Matching estimates—Products: In & Out AGOA

Outcome	Radius ($\delta = 0.05$)	Radius ($\delta = 0.1$)	Radius ($\delta = 0.2$)	Kernel ($\kappa = 0.06$)	Kernel ($\kappa = 0.1$)	Kernel ($\kappa = 0.2$)	Stratification
USA AMDS	-102 800	-119 600	-123 900	-118 200	-112 400	-125 400	-96 683.2
Std. Error	137 300	126 600	99 279.3	131 600	128 400	111 000	108 100
Z-statistic	-0.749	-0.945	-1.248	-0.898	-0.875	-1.130	-0.894
# Control	32	32	32	32	32	32	10
# AGOA	10	10	10	10	10	10	9
USA FBTWP	41 188.6	31 598	11 481.7	36 191.8	29 125	15 385.9	49 540.3
Std. Error	108 500	81 132.5	75 798.6	106 500	83 624.8	75 907.5	94 560.2
Z-statistic	0.380	0.389	0.151	0.340	0.348	0.203	0.524
# Control	32	32	32	32	32	32	10
# AGOA	9	9	9	9	9	9	9
USA EI	-4 845.8	-19 559.3	-174 800	-13 878.1	-15 890.9	-135 500	-4 123.3
Std. Error	101 400	8 6975.9	184 200	98 937.6	86 999.3	169 800	79 973.1
Z-statistic	-0.048	-0.225	-0.949	-0.140	-0.183	-0.798	-0.052
# Control	30	30	30	30	30	30	10
# AGOA	10	10	10	10	10	10	9
USA CPR	-23 151.9	-27 202.5	-80 669.2	-26 591.3	-25 481.7	-67 579.9	-22 328.9
Std. Error	31 943.7	28 772.8	69 649.2	30 507.9	29 277.1	59 974.5	25 136.5
Z-statistic	-0.725	-0.945	-1.158	-0.872	-0.870	-1.127	-0.888
# Control	32	32	32	32	32	32	10
# AGOA	10	10	10	10	10	10	9
USA TALF	-822 800	-937 100	-1 042 000	-907 200	-824 300	-1 030 000	-857 300
Std. Error	661 800	597 800	504 300	635 100	596 200	538 900	544 000
Z-statistic	-1.243	-1.568	-2.066**	-1.428	-1.383	-1.911*	-1.576
# Control	32	32	32	32	32	32	10
# AGOA	10	10	10	10	10	10	9
USA ISOM	-4 256	-9 987.4	-47 779.9	-6 569.9	-9 023.4	-38 497.4	-7 272.9
Std. Error	21 231.3	20 697.7	47 689.4	21 130.5	20 766.7	38 073.4	17 977.1
Z-statistic	-0.200	-0.483	-1.002	-0.311	-0.435	-1.011	-0.405
# Control	31	31	31	31	31	31	10
# AGOA	10	10	10	10	10	10	9
USA METE	-53 096.4	-61 481.9	-170 000	-60 339.3	-58 355.3	-133 000	-49 225.9
Std. Error	73 968.3	67 870	123 000	71 285.4	68 904.3	99 303.7	58 671.7
Z-statistic	-0.718	-0.906	-1.379	-0.846	-0.847	-1.335	-0.839
# Control	32	32	32	32	32	32	10
# AGOA	10	10	10	10	10	10	9
USA OI	-108 700	-126 000	-118 500	-123 700	-119 400	-123 300	-101 000
Std. Error	151 100	138 600	108 600	145 600	140 800	121 300	119 700
Z-statistic	-0.719	-0.909	-1.091	-0.850	-0.848	-1.016	-0.844
# Control	32	32	32	32	32	32	10
# AGOA	10	10	10	10	10	10	9

All standard errors are bootstrapped with 250 replications. Covariates used in matching include proxies for governance (corruption), economic structure, gravity type variables. Critical Z-values are $Z(\alpha = 0.05) = 1.96$ and $Z(\alpha = 0.1) = 1.64$ for the 5% and 10% significance levels respectively for the Radius and Kernel matching estimates. The Stratification estimates are based on the Student's t distribution—the critical values for the 10% and 5% $t_{0.1,19} = 1.729$; $t_{0.1,40} = 1.684$ and $t_{0.05,19} = 2.093$; $t_{0.05,40} = 2.021$ are respectively. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97). Note that: ATT estimate and standard errors are in thousands of US \$. ** 5%, * 10%

Table 4.5: Matching estimates: Always AGOA

Outcome	Radius ($\delta = 0.05$)	Radius ($\delta = 0.1$)	Radius ($\delta = 0.2$)	Kernel ($\kappa = 0.06$)	Kernel ($\kappa = 0.1$)	Kernel ($\kappa = 0.2$)	Stratification
Exports	-740 500	-767 500	-1 008 000	-561 100	-541 600	-1 018 000	-417 900
Std. Error	1 725 000	1 353 000	1 105 000	1 620 000	1 291 000	1 151 000	1 294 000
Z-statistic	-0.429	-0.567	-0.912	-0.346	-0.420	-0.884	-0.323
# Control	34	34	34	34	34	34	34
# AGOA	29	29	29	29	29	29	29
Export Share	0.069	0.046	0.016	0.060	0.052	0.017	0.056
Std. Error	0.054	0.047	0.052	0.053	0.048	0.052	0.050
Z-statistic	1.272	0.980	0.305	1.138	1.099	0.334	1.119
# Control	34	34	34	34	34	34	34
# AGOA	29	29	29	29	29	29	29
Exports (2002 - 1997)	-406 800	-439 000	-535 700	-378 600	-385 300	-530 000	
Std. Error	294 500	231 700	208 800	276 000	219 800	210 000	
Z-statistic	-1.381	-1.895*	-2.566**	-1.372	-1.753*	-2.524**	
# Control	33	33	33	33	33	33	
# AGOA	24	24	24	24	24	24	
Exports (2005 - 1997)	378 900	140 900	-82 480.8	330 600	278 400	-50 735.8	
Std. Error	1 273 000	1 027 000	923 400	1 181 000	1 016 000	948 700	
Z-statistic	0.298	0.137	-0.089	0.280	0.274	-0.053	
# Control	33	33	33	33	33	33	
# AGOA	24	24	24	24	24	24	
Exports (2007 - 1997)	757 100	420 300	123 300	653 900	585 400	169 800	
Std. Error	1 884 000	1 494 000	1 335 000	1 761 000	1 501 000	1 375 000	
Z-statistic	0.402	0.281	0.092	0.371	0.390	0.123	
# Control	33	33	33	33	33	33	
# AGOA	24	24	24	24	24	24	
Exports (2010 - 1997)	360 400	79 372.4	-230 200	255 700	209 200	-194 000	
Std. Error	2 091 000	1 517 000	1 344 000	1 969 000	1 566 000	1 390 000	
Z-statistic	0.172	0.052	-0.171	0.130	0.134	-0.140	
# Control	33	33	33	33	33	33	
# AGOA	24	24	24	24	24	24	

All standard errors are bootstrapped with 250 replications. Covariates used in matching include proxies for governance (corruption), economic structure, gravity type variables. Critical Z-values are $Z(\alpha = 0.05) = 1.96$ and $Z(\alpha = 0.1) = 1.64$ for the 5% and 10% significance levels respectively for the Radius and Kernel matching estimates. The Stratification estimates are based on the Student's t distribution—the critical values for the 5% and 10% $t_{0.05,50} = 2.009$; $t_{0.05,60} = 2.000$ and $t_{0.1,50} = 1.676$; $t_{0.1,60} = 1.671$ are respectively. Note that: ATT estimate and standard errors for levels are in thousands of US $. ** 5%, * 10%

Table 4.6: Matching estimates—Products: Always AGOA

Outcome	Radius ($\delta = 0.05$)	Radius ($\delta = 0.1$)	Radius ($\delta = 0.2$)	Kernel ($\kappa = 0.06$)	Kernel ($\kappa = 0.1$)	Kernel ($\kappa = 0.2$)	Stratification
USA AMDS	-129 600	-140 500	-156 000	-118 300	-117 300	-152 500	-136 900
Std. Error	91 855.8	80 335.3	72 367.5	86 870.8	69 854.8	70 790.1	94 796.2
Z-statistic	-1.411	-1.749*	-2.156**	-1.362	-1.679*	-2.154**	-1.444
# Control	34	34	34	34	34	34	34
# AGOA	29	29	29	29	29	29	29
USA FBTWP	-47 330.2	-93 399	-136 600	-41 241.1	-56 017.1	-123 900	-83 719
Std. Error	44 492.7	57 565.1	77 252	39 082.4	40 218.3	72 684.2	60 785.7
Z-statistic	-1.064	-1.622	-1.768*	-1.055	-1.393	-1.705*	-1.377
# Control	34	34	34	34	34	34	34
# AGOA	28	28	28	28	28	28	29
USA EI	682 400	849 300	870 000	717 400	799 000	837 200	661 400
Std. Error	1 040 000	822 400	773 000	932 100	840 400	778 600	984 400
Z-statistic	0.656	1.033	1.125	0.770	0.951	1.075	0.672
# Control	32	32	32	32	32	32	34
# AGOA	29	29	29	29	29	29	29
USA CPR	-117 000	-106 100	-110 200	-108 100	-97 700	-116 900	-84 197
Std. Error	136 300	85 738	66 095.1	131 100	92 604	74 460	83 952
Z-statistic	-0.858	-1.237	-1.667*	-0.825	-1.055	-1.570	-1.003
# Control	34	34	34	34	34	34	34
# AGOA	29	29	29	29	29	29	29
USA TALF	-563 900	-607 300	-774 700	-565 400	-583 500	-776 700	-421 500
Std. Error	405 700	330 000	296 500	412 000	371 400	319 400	269 500
Z-statistic	-1.390	-1.840*	-2.613**	-1.372	-1.571	-2.432**	-1.564
# Control	34	34	34	34	34	34	34
# AGOA	29	29	29	29	29	29	29
USA ISOM	-91 920.3	-99 138	-131 200	-87 158.4	-74 079.9	-126 800	-99 403.8
Std. Error	137 200	103 800	98 365.9	123 900	96 168.9	100 100	125 800
Z-statistic	-0.670	-0.955	-1.334	-0.703	-0.770	-1.267	-0.790
# Control	33	33	33	33	33	33	34
# AGOA	28	28	28	28	28	28	29
USA METE	-451 300	-517 000	-505 500	-356 900	-374 800	-509 700	-241 500
Std. Error	380 600	438 000	333 800	307 400	288 800	332 000	259 000
Z-statistic	-1.186	-1.180	-1.514	-1.161	-1.298	-1.535	-0.932
# Control	34	34	34	34	34	34	34
# AGOA	29	29	29	29	29	29	29
USA OI	-104 900	-100 300	-107 600	-87 832	-88 461.4	-103 900	-63 201.6
Std. Error	74 315.7	62 061.6	53 391.5	65 962	56 070.3	49 719.8	50 792.3
Z-statistic	-1.412	-1.616	-2.015	-1.332	-1.578	-2.090**	-1.244
# Control	34	34	34	34	34	34	34
# AGOA	29	29	29	29	29	29	29

All standard errors are bootstrapped with 250 replications. Covariates used in matching include proxies for governance (corruption), economic structure, gravity type variables. Critical Z-values are $Z(\alpha = 0.05) = 1.96$ and $Z(\alpha = 0.1) = 1.64$ for the 5% and 10% significance levels respectively for the Radius and Kernel matching estimates. The Stratification estimates are based on the Student's t distribution—the critical values for the 5% and 10% $t_{0.05,50} = 2.009$; $t_{0.05,60} = 2.000$ and $t_{0.1,50} = 1.676$; $t_{0.1,60} = 1.671$ are respectively. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97). Note that: ATT estimate and standard errors are in thousands of US \$. ** 5%, * 10%

Table 4.7: Matching estimates: AGOA & EBA preferences

Outcome	Radius ($\delta = 0.05$)	Radius ($\delta = 0.1$)	Radius ($\delta = 0.2$)	Kernel ($\kappa = 0.06$)	Kernel ($\kappa = 0.1$)	Kernel ($\kappa = 0.2$)	Stratification
Exports	-1 138 000	-1 042 000	-1 195 000	-915 000	-835 600	-1 278 000	-563 800
Std. Error	1 149 000	923 500	686 800	1 060 000	824 400	718 200	957 900
Z-statistic	-0.990	-1.128	-1.740*	-0.863	-1.014	-1.779*	-0.589
# Control	34	34	34	34	34	34	34
# AGOA	17	17	17	17	17	17	17
Export Share	0.070	0.052	0.000	0.057	0.053	0.006	0.056
Std. Error	0.073	0.060	0.065	0.068	0.060	0.065	0.062
Z-statistic	0.964	0.867	0.006	0.838	0.888	0.092	0.910
# Control	34	34	34	34	34	34	34
# AGOA	17	17	17	17	17	17	17
Exports (2002 - 1997)	-384 700	-372 100	-410 700	-330 600	-325 900	-440 800	
Std. Error	339 200	242 000	167 300	268 400	225 900	188 300	
Z-statistic	-1.134	-1.538	-2.455**	-1.232	-1.443	-2.341**	
# Control	33	33	33	33	33	33	
# AGOA	15	15	15	15	15	15	
Exports (2005 - 1997)	-415 900	-488 900	-528 400	-344 100	-366 900	-600 700	
Std. Error	842 600	662 500	498 400	674 900	584 700	545 000	
Z-statistic	-0.494	-0.738	-1.060	-0.510	-0.628	-1.102	
# Control	33	33	33	33	33	33	
# AGOA	15	15	15	15	15	15	
Exports (2007 - 1997)	-449 200	-582 800	-657 300	-369 300	-421 400	-756 200	
Std. Error	1 283 000	1 045 000	808 300	1 070 000	947 700	876 800	
Z-statistic	-0.350	-0.558	-0.813	-0.345	-0.445	-0.862	
# Control	33	33	33	33	33	33	
# AGOA	15	15	15	15	15	15	
Exports (2010 - 1997)	-755 100	-886 200	-944 600	-639 600	-708 400	-1 106 000	
Std. Error	1 673 000	1 336 000	998 100	1 391 000	1 242 000	1 097 000	
Z-statistic	-0.451	-0.663	-0.946	-0.460	-0.570	-1.008	
# Control	33	33	33	33	33	33	
# AGOA	15	15	15	15	15	15	

All standard errors are bootstrapped with 250 replications. Covariates used in matching include proxies for governance (corruption), economic structure, gravity type variables. Critical Z-values are $Z(\alpha = 0.05) = 1.96$ and $Z(\alpha = 0.1) = 1.64$ for the 5% and 10% significance levels respectively for the Radius and Kernel matching estimates. The Stratification estimates are based on the Student's t distribution—the critical values for the 5% and 10% $t_{0.05,50} = 2.009$ and $t_{0.1,50} = 1.676$ are respectively. Note that: ATT estimate and standard errors for levels are in thousands of US $. ** 5%, * 10%

Table 4.8: Matching estimates—Products: AGOA & EBA preferences

Outcome	Radius ($\delta = 0.05$)	Radius ($\delta = 0.1$)	Radius ($\delta = 0.2$)	Kernel ($\kappa = 0.06$)	Kernel ($\kappa = 0.1$)	Kernel ($\kappa = 0.2$)	Stratification
USA AMDS	-148 300	-120 500	-97 424.8	-125 300	-113 100	-115 900	-90 637.4
Std. Error	134 600	95 480.2	53 314.9	119 600	97 092.2	65 208.6	80 159.2
Z-statistic	-1.102	-1.262	-1.827*	-1.048	-1.165	-1.777*	-1.131
# Control	34	34	34	34	34	34	34
# AGOA	17	17	17	17	17	17	17
USA FBTWP	-35 417.1	-65 330.7	-58 253.6	-30 717	-36 900.1	-61 741.8	-49 949.8
Std. Error	34 478.8	60 255.1	36 664.2	30 385.4	31 217.2	42 900.9	43 274.8
Z-statistic	-1.027	-1.084	-1.589	-1.011	-1.182	-1.439	-1.154
# Control	34	34	34	34	34	34	34
# AGOA	16	16	16	16	16	16	17
USA EI	222 600	273 100	322 300	264 500	263 700	304 600	219 000
Std. Error	865 500	551 400	469 800	733 400	576 700	491 900	905 900
Z-statistic	0.257	0.495	0.686	0.361	0.457	0.619	0.242
# Control	32	32	32	32	32	32	34
# AGOA	17	17	17	17	17	17	17
USA CPR	-83 050.1	-86 698.3	-78 821	-75 511.3	-73 086.3	-88 724.4	-57 838.6
Std. Error	84 536.9	79 356.1	56 484.4	82 960	74 977.8	64 020.5	83 941.2
Z-statistic	-0.982	-1.093	-1.395	-0.910	-0.975	-1.386	-0.689
# Control	34	34	34	34	34	34	34
# AGOA	17	17	17	17	17	17	17
USA TALF	-512 600	-489 700	-776 100	-505 600	-473 500	-797 300	-361 500
Std. Error	438 600	346 300	305 000	441 800	355 600	340 300	315 000
Z-statistic	-1.169	-1.414	-2.545**	-1.144	-1.332	-2.343**	-1.148
# Control	34	34	34	34	34	34	34
# AGOA	17	17	17	17	17	17	17
USA ISOM	-141 500	-114 400	-88 894.2	-124 000	-102 600	-104 200	-77 888.4
Std. Error	171 100	132 300	66 627.6	142 900	112 000	80 816.3	80 295
Z-statistic	-0.827	-0.865	-1.334	-0.868	-0.916	-1.289	-0.970
# Control	33	33	33	33	33	33	34
# AGOA	16	16	16	16	16	16	17
USA METE	-277 200	-348 000	-340 700	-207 800	-203 500	-330 900	-118 500
Std. Error	299 800	310 700	254 000	222 400	174 000	230 900	171 700
Z-statistic	-0.925	-1.120	-1.341	-0.934	-1.170	-1.433	-0.690
# Control	34	34	34	34	34	34	34
# AGOA	17	17	17	17	17	17	17
USA OI	-98 894.7	-94 344.4	-83 520.3	-76 240.1	-77 231.2	-90 276.8	-48 706.5
Std. Error	99 475.4	74 884.6	48 137.3	79 147.9	72 521.7	54 081.8	57 245.1
Z-statistic	-0.994	-1.260	-1.735	-0.963	-1.065	-1.669*	-0.851
# Control	34	34	34	34	34	34	34
# AGOA	17	17	17	17	17	17	17

All standard errors are bootstrapped with 250 replications. Covariates used in matching include proxies for governance (corruption), economic structure, gravity type variables. Critical Z-values are $Z(\alpha = 0.05) = 1.96$ and $Z(\alpha = 0.1) = 1.64$ for the 5% and 10% significance levels respectively for the Radius and Kernel matching estimates. The Stratification estimates are based on the Student's t distribution—the critical values for the 5% and 10% $t_{0.05,50} = 2.009$ and $t_{0.1,50} = 1.676$ are respectively. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97). Note that: ATT estimate and standard errors are in thousands of US \$. ** 5%, * 10%

4.3.2 Robustness and sensitivity results

This section presents further results based on Abadie et al.'s (2001) and Abadie and Imbens (2011) matching estimator. The matching estimators are based on the nearest neighbour matching approach and provide additional bias correction to the estimated average treatment on the treated (ATT) results. The results presented here are not based on the propensity score estimate but rather matching is based on the covariates listed below each table. The estimators also provide a means of correcting the estimated standard errors for any heteroscedasticity that might be present in the standard errors due to differences in the treatment effect across the treated and the controls. Results based on the nearest neighbour but using the mahalanobis distance estimation are also shown. Further results testing the sensitivity of the ATT estimates to the presence of confounding or unobserved factors are also presented. The sensitivity estimates are based on Ichino et al. (2006) and Nannicini (2007). The approach allows one to simulate the output (Γ) and selection (Λ) effects that can drive the ATT estimates to zero. In the appendix to this chapter (appendix C) we present additional results[10]

In discussing the nearest neighbour results below we focus on model B. Model B has been augmented with additional covariates that should lead us to closer matches of our treated countries with our controls compared to model A. Model A provides a baseline estimate that can be compared to the propensity score matching results of the previous section—given that, the same covariates are specified.

In table (4.9), TALF is the only significant cluster among the product exports. The treated countries had \$ -3.9 billion lower exports compared to the control countries on average and *ceteris paribus*. Our previous explanation that the TALF cluster contains leather and footwear products that are probably crowding out the apparel and textile products still holds. In addition, the treated countries, include countries that have not consistently maintained their AGOA status—thus, they also crowd out whatever increases in exports the consistent exporters might obtain.

The remaining non-significant products with the exception of the extractive industry are not key exports of the AGOA countries. The export difference between the selected post-AGOA years and 1997 provide no significant estimates. Again, there may be crowding out effects occurring. We note briefly, that the baseline estimates for the export differences and the non-GSP share are significant. The non-GSP share is positive while the export differences are negative. The baseline estimate is 0.6 points lower than our preferred estimate in model B. Similarly, the baseline estimates for the export differences are also relatively lower than the model B estimates. The export difference increases in magnitude as we move from 2002 to 2010. An indication that in the short-term, the losses relative to the counter-factual on average is smaller. However, as we look at the longer-term, the magnitude increases. Thus, compared to the counter-factual countries, the negative impact becomes larger implying a larger negative impact of the preference on average and *ceteris paribus*. We however, note that 2007 and 2010 are linked to the financial and food crisis that occurred during the period. The USA economy was one of the worse hit and this affected their ability to import. Additionally, the food crisis affected exports of a number of developing countries (with African countries among

[10] Tables showing additional propensity score matching and nearest neighbour results are presented including the results controlling for heteroscedasticity of the standard errors. Further tables based on Ichino et al. (2006) and Nannicini (2007) that assume the confounding variables to be income and religion are also presented. Rosenbaum's bounds sensitivity analysis results for selected outcomes are presented for the interested reader of this thesis. Additional results not shown are also available upon request.

the severely hit due to the food crisis). We expect these events to affect the estimated difference for these years and may probably yield results of a higher magnitude for these two years.

Table (4.10) concentrates on countries that have consistently maintained their AGOA status. We limit the set of countries to those that received preferences until 2003 and ignore countries that received their preferences after 2003. The results are similar to the previous table, however, a few more significant estimates are reported. Our baseline estimates report significant estimates for a few more product clusters. The baseline estimates in a few cases report smaller absolute estimates compared to model B—for example, all the export differences. All remaining significant estimates are negative implying that the treated countries had lower exports relative to the counter-factual on average and *ceteris paribus*.

TALF products remain significant and are $ 3.6 billion lower for the treated countries compared to the counter-factual on average and all things equal. AMDS exports is now significant and shows the treated countries have $ 973 million lower exports than the counter-factual on average. The strong support provided to agriculture by the USA means that, the treated countries need to be competitive at producing products within this cluster to enjoy any positive impact. Few countries among the treated are able to meet the strong standards required by the USA. Nevertheless, even fewer countries manage processing and packaging of the AMDS cluster of products. The majority of products are exported with limited processing. For example, the bulk of cocoa and cocoa related exports of Ghana and Ivory Coast is dried cocoa beans. Further processing of these products into final products results in higher tariffs, thus, these countries resort to exporting the unprocessed and semi-processed cocoa related products to enjoy lower tariffs.

Turning our attention to table (4.11) we focus on AGOA countries that have consistently maintained their AGOA status and that also have the EBA preferences of the EU. There are fewer significant estimates. The results for our main model—model B, shows no significant results for the export differences. The total exports to the USA, AMDS, CPR, TALF, ISOM, and IO product clusters are all significant. All remaining significant coefficients are negative. The result for total exports to the USA shows that the treated countries had $ 712.3 million lower exports compared to the counter-factual countries on average and *ceteris paribus*. This has not been significant in the previous tables but shows up significant in model B of the table. Thus, in aggregate given that most of the products in the table report a negative estimate—our result for total exports is therefore not surprising. The result here, means that for our treated countries analysed in the table, the impact of AGOA has been negative, all things equal.

In terms of the product clusters, the reported estimates are $ -40.6 million, $ -7.2 million, $ -695.7 million, $ 5 million and $ -1.99 million for AMDS, CPR, TALF, ISOM and OI exports respectively. The TALF and AMDS estimates are consistent with the previous results although the magnitude reported here is much smaller compared to the previous results. ISOM presents a positive coefficient which implies that the treated countries have $ 5.7 million higher exports compared to the counter-factual on average and *ceteris paribus*. This result provides a positive impact of the AGOA preference for the ISOM cluster. The composition of the treated countries is probably linked to this result. By focussing on a smaller subset of the AGOA countries, we may have reduced the crowding out effect seen previously. Although, we observe relatively lower estimates compared to the previous tables in this section, we do not see a change in the sign of the remaining products that were previously significant. This implies that, we may have reduced the crowding out effect within the treated countries but the crowding out effect within the product cluster still remains. Thus, given the definition of the clusters, the average impact remains negative given that a significant number of products within each cluster do not fall under the AGOA preferential tariff list.

Tables (4.12)–(4.14) are based on the mahalanobis distance metric. The same three definitions of the treated countries—that is, 'all AGOA', 'always AGOA' and 'AGOA & EBA' are used. Model B remains our preferred model with model A providing us with the baseline estimates consistent with the results reported in the previous section.

Table (4.12) shows the results for the 'all AGOA' group of countries. The significant results in table (4.9) are also significant here in addition to the significant AMDS and OI product clusters. The export differences are negative supporting the results in table (4.9). The treated countries have \$ 806.9 million, \$ 2.9 billion and \$ 4.9 billion lower exports compared to the counter-factual on average for AMDS, TALF and OI products.

In table (4.13) we find fewer significant results than table (4.10). For the baseline estimates, the export differences are no longer significant while in model B, AMDS and TALF products are no longer significant. Again, we attribute the non-significance and negative effects in some of the outcomes to the crowding-out occurring within the group of treated countries and the product clusters.

The change in approach and the definition of the treatment group, (that is countries that have been consistent in maintaining their AGOA status and adopting the mahalanobis metric approach) we have been able to improve our matching results. The averaging effects thus, either eliminates any statistical differences we might find or returns a negative estimate for key products such as TALF that we expect to be positive or those that show no significance—for example, the EI cluster.

Table (4.14) provides the final results of the nearest neighbour for the 'AGOA & EBA' treated group of countries. We obtain fewer significant results compared to table (4.11). How can we reconcile the results across the nearest neighbour and the nearest neighbour with the mahalanobis distance metric? Given that the number of treated countries and control countries have not changed across the two sets of tables (that is, tables 4.9–4.11 and the corresponding tables in 4.12–4.14) we do find differences across the sets of results. All the export differences (models A and B) in tables (4.11 & 4.14) are almost the same (since the results are rounded off)—the remaining results are quite different. On the contrary tables (4.9–4.10 & 4.12–4.13) do not show such similarity. In the computation of the matches, the algorithm introduces these subtle differences. For instance in tables (4.11 & 4.14 our treated countries are 17, thus using the mahalanobis distance metric to match the control countries to the treated countries in many instances might result in a similar configuration of matches and thus similar estimates as we observe. Tables (4.9–4.10 & 4.12–4.13) however, have more treated countries (29 & 42)—therefore when matching is performed using the mahalanobis distance metric it is possible to have a different configuration of matches and hence in most cases results would be different across the tables. The difference in the configuration of matches is due to the different weighting matrices[11] used in estimating the ATT estimates.

[11]The first three nearest neighbour matching results draw on the $k \times k$ diagonal matrix of all k covariates used in the match (Abadie et al., 2001). The diagonal matrix is composed of the inverse sample standard errors of the matching covariates (Abadie et al., 2001). The mahalanobis distance metric on the other hand draws on the variance-covariance matrix of the k matching covariates (Abadie et al., 2001). Depending on how different these weighting matrices are the results can either be very different or similar.

Nonetheless, with respect to all the negative estimates, we believe chapter 5 throws more light on this. Essentially, in the next chapter we find that the top ranked exporters of AGOA are driving all the gains in exports. These few countries included with all the remaining countries contribute to the average impacts shown. The average impacts therefore turn negative given that a number of small exporters are included in the calculation. These countries crowd-out any positive impacts that might have been obtained if they were not included in the estimation[12].

[12]We do not focus on only the top five AGOA exporters to check this assertion. However, the quantile results in the next chapter and the diagrams shown in the next section of this chapter show that the countries outside the top five have comparatively lower exports. Thus, any average would be driven downwards by all the remaining countries.

Table 4.9: Nearest Neighbour matching based on Abadie and Imbens (2011) & Abadie et al.'s (2001) (All AGOA)

	Model A: Covariates based on propensity score[a]					Model B: With additional covariates[b]				
Outcome	# Treated	# Control	ATT	Std. Error	Z-statistic	# Treated	# Control	ATT	Std. Error	Z-statistic
Exports	42	81	887 784 316.95	2 956 911 732.78	0.300	42	43	-29 491 120 874.57	23 133 948 285.72	-1.275
Export Share	42	81	0.09	0.09	1.039	42	43	-0.10	0.09	-1.065
Exports (2002 - 1997)	42	74	-858 394 480.65	442 793 876.38	-1.939*	42	37	-3 447 695 468.33	4 142 934 259.09	-0.832
Exports (2005 - 1997)	42	74	-2 772 013 571.46	1 489 387 904.14	-1.861*	42	37	-8 415 529 773.33	9 706 886 566.26	-0.867
Exports (2007 - 1997)	42	74	-3 385 911 663.57	1 738 186 811.31	-1.948*	42	37	-10 705 279 677.33	10 389 608 873.17	-1.030
Exports (2010 - 1997)	42	74	-4 714 505 814.05	1 836 831 084.84	-2.567**	42	37	-11 974 113 906.67	8 799 242 391.75	-1.361
Exports: AMDS	42	80	-137 290 730.24	57 196 795.66	-2.400**	42	42	-1 395 779 346.25	912 051 183.87	-1.530
Exports: FBTWP	42	77	-14 709 685.38	105 985 526.14	-0.139	42	42	-3 643 609 983.79	2 850 655 816.72	-1.278
Exports: EI	42	78	661 351 324.75	970 325 287.86	0.682	42	42	-5 506 797 047.14	4 380 617 291.45	-1.257
Exports: CPR	42	79	-12 475 508.76	121 248 873.70	-0.103	42	41	-1 850 235 901.11	1 470 690 175.35	-1.258
Exports: TALF	42	80	-413 507 507.81	278 174 576.93	-1.487	42	42	-3 875 577 550.29	1 985 610 957.58	-1.952*
Exports: ISOM	42	76	25 160 975.72	45 196 944.09	0.557	42	40	-3 043 914 928.52	2 389 909 182.88	-1.274
Exports: METE	42	81	532 315 632.76	2 193 685 503.28	0.243	42	43	-8 669 121 066.29	8 454 513 990.10	-1.025
Exports: OI	42	81	-52 088 130.79	159 683 566.71	-0.326	42	43	-1 236 928 121.29	937 062 411.22	-1.320

Critical values $Z(\alpha = 0.05) = 1.96$; $Z(\alpha = 0.1) = 1.64$, ** 5%, * 10%. Matching Variables: landlocked, LI, LMI, Majority Christian, Majority Muslim Distance (Weighted, in logs), Real GDP (logs), Distance squared, Real GDP squared, LI × Real GDP, LMI × Real GDP, UMI × Real GDP. Bias-adj Variables: landlocked, LI, LMI, Majority Christian, Majority Muslim Distance (Weighted, in logs), Real GDP (logs), Distance squared, Real GDP squared, LI × Real GDP, LMI × Real GDP, UMI × Real GDP. [a]: Covariates used in estimating the propensity score model is used here for comparison; [b]: Additional covariates — land and capital per worker as well as human capital are included and are also included in the bias–adjustment. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Table 4.10: Nearest Neighbour matching based on Abadie and Imbens (2011) & Abadie et al.'s (2001) (Always AGOA)

	Model A: Covariates based on propensity score[a]					Model B: With additional covariates[b]				
Outcome	# Treated	# Control	ATT	Std. Error	Z-statistic	# Treated	# Control	ATT	Std. Error	Z-statistic
Exports	29	81	-2 268 177 597.79	3 366 676 701.21	-0.674	29	49	-24 358 417 115.43	17 487 531 463.55	-1.393
Export Share	29	81	0.16	0.11	1.441	29	49	-0.14	0.18	-0.765
Exports (2002 - 1997)	29	74	-1 583 926 939.75	606 232 823.66	-2.613**	29	43	-1 287 314 477.18	5 437 171 123.20	-0.237
Exports (2005 - 1997)	29	74	-4 444 933 397.33	2 031 152 792.30	-2.188**	29	43	-3 565 966 366.12	12 638 987 434.56	-0.282
Exports (2007 - 1997)	29	74	-6 271 542 880.00	2 585 662 077.32	-2.426**	29	43	-5 515 612 672.00	12 934 588 051.22	-0.426
Exports (2010 - 1997)	29	74	-8 994 013 280.00	3 222 827 519.84	-2.791**	29	43	-7 887 605 910.59	9 135 760 001.20	-0.863
Exports: AMDS	29	80	-348 006 949.53	117 059 239.93	-2.973**	29	48	-973 722 300.19	546 169 885.33	-1.783*
Exports: FBTWP	29	79	-192 410 964.02	116 511 042.38	-1.651*	29	48	-1 974 507 206.86	1 975 866 723.84	-0.999
Exports: EI	29	78	940 949 798.55	1 210 198 982.27	0.778	29	48	-2 403 369 377.52	2 849 334 185.42	-0.843
Exports: CPR	29	80	-186 718 080.03	130 703 125.29	-1.429	29	48	-1 253 150 561.52	1 049 148 019.32	-1.194
Exports: TALF	29	80	-614 525 224.83	354 005 971.46	-1.736*	29	48	-3 558 571 027.05	1 774 197 685.81	-2.006**
Exports: ISOM	29	77	-25 916 712.10	51 916 782.51	-0.499	29	46	-1 546 528 556.80	1 882 353 915.97	-0.822
Exports: METE	29	81	-1 715 908 140.14	2 400 121 636.51	-0.715	29	49	-11 133 718 259.81	8 444 383 757.68	-1.318
Exports: OI	29	81	-442 057 096.00	195 480 352.75	-2.261**	29	49	-1 545 511 295.24	984 557 132.79	-1.570

Critical values $Z(\alpha = 0.05) = 1.96$; $Z(\alpha = 0.1) = 1.64$, ** 5%, * 10%. Matching Variables: landlocked, LI, LMI, Majority Christian, Majority Muslim Distance (Weighted, in logs), Real GDP (logs), Distance squared, Real GDP squared, LI × Real GDP, LMI × Real GDP, UMI × Real GDP. Bias-adj Variables: landlocked, LI, LMI, Majority Christian, Majority Muslim Distance (Weighted, in logs), Real GDP (logs), Distance squared, Real GDP squared, LI × Real GDP, LMI × Real GDP, UMI × Real GDP. [a]: Covariates used in estimating the propensity score model is used here for comparison; [b]: Additional covariates — land and capital per worker as well as human capital are included and are also included in the bias–adjustment. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Table 4.11: Nearest Neighbour matching based on Abadie and Imbens (2011) & Abadie et al.'s (2001) (AGOA & EBA preferences

	Model A: Covariates based on propensity score[a]					Model B: With additional covariates[b]				
Outcome	# Treated	# Control	ATT	Std. Error	Z-statistic	# Treated	# Control	ATT	Std. Error	Z-statistic
Exports	17	81	643 400 246.59	1 619 368 492.90	0.397	17	51	-712 261 920.00	348 589 820.38	-2.043**
Export Share	17	81	0.34	0.22	1.545	17	51	0.13	0.11	1.096
Exports (2002 - 1997)	17	77	690 825 666.67	582 655 942.01	1.186	17	48	-86 520 784.00	248 541 158.15	-0.348
Exports (2005 - 1997)	17	77	170 222 497.07	762 901 917.54	0.223	17	48	-214 481 926.40	377 315 077.51	-0.568
Exports (2007 - 1997)	17	77	937 469 676.80	1 193 589 757.36	0.785	17	48	-361 668 038.40	546 864 845.66	-0.661
Exports (2010 - 1997)	17	77	-215 200 215.47	1 211 382 961.93	-0.178	17	48	-630 701 215.20	431 636 856.81	-1.461
Exports: AMDS	17	80	-42 838 417.53	41 913 301.57	-1.022	17	50	-40 552 537.45	21 199 458.40	-1.913*
Exports: FBTWP	17	79	27 329 075.61	22 415 963.91	1.219	17	50	3 662 901.38	4 924 123.21	0.744
Exports: EI	17	78	606 709 326.44	624 366 404.84	0.972	17	50	24 240 091.27	45 333 789.82	0.535
Exports: CPR	17	80	-41 866 274.82	28 858 891.05	-1.451	17	50	-7 208 332.44	3 748 612.82	-1.923*
Exports: TALF	17	80	2 386 030 575.53	1 523 784 427.06	1.566	17	50	-695 698 394.55	373 555 874.27	-1.862*
Exports: ISOM	17	77	-30 214 526.50	24 939 253.41	-1.212	17	48	5 725 966.85	2 957 539.82	1.936*
Exports: METE	17	81	-1 895 098 744.47	1 327 879 128.93	-1.427	17	51	134 146.18	303 754.51	0.442
Exports: OI	17	81	-95 451 790.82	132 639 926.99	-0.720	17	51	-1 993 063.65	786 160.17	-2.535**

Critical values $Z(\alpha = 0.05) = 1.96$; $Z(\alpha = 0.1) = 1.64$, ** 5%, * 10%. Matching Variables: landlocked, LI, LMI, Majority Christian, Majority Muslim Distance (Weighted, in logs), Real GDP (logs), Distance squared, Real GDP squared, LI × Real GDP, LMI × Real GDP, UMI × Real GDP. Bias-adj Variables: landlocked, LI, LMI, Majority Christian, Majority Muslim Distance (Weighted, in logs), Real GDP (logs), Distance squared, Real GDP squared, LI × Real GDP, LMI × Real GDP, UMI × Real GDP. [a]: Covariates used in estimating the propensity score model is used here for comparison; [b]: Additional covariates — land and capital per worker as well as human capital are included and are also included in the bias–adjustment. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Table 4.12: Exact Nearest Neighbour matching based on Abadie and Imbens (2011) & Abadie et al.'s (2001) (All AGOA) Mahalanobis metric

	Model A: Covariates based on propensity score[a]					Model B: With additional covariates[b]				
Outcome	# Treated	# Control	ATT	Std. Error	Z-statistic	# Treated	# Control	ATT	Std. Error	Z-statistic
Exports	42	81	723 299 184.76	1 133 080 823.55	0.638	42	43	-29 753 995 785.14	23 535 570 640.72	-1.264
Export Share	42	81	0.09	0.09	0.985	42	43	-0.26	0.27	-0.969
Exports (2002 - 1997)	42	74	-539 973 796.22	175 888 876.36	-3.070**	42	37	-2 643 930 903.17	4 062 815 840.59	-0.651
Exports (2005 - 1997)	42	74	-1 629 601 213.41	886 199 713.65	-1.839*	42	37	-6 822 892 445.33	9 556 153 831.45	-0.714
Exports (2007 - 1997)	42	74	-2 436 624 108.11	1 343 111 328.88	-1.814*	42	37	-8 846 669 305.67	10 180 541 145.34	-0.869
Exports (2010 - 1997)	42	74	-4 259 853 571.68	1 683 773 094.61	-2.530**	42	37	-10 061 016 744.00	8 519 045 704.42	-1.181
Exports: AMDS	42	80	-147 563 343.10	59 446 794.48	-2.482**	42	42	-1 348 290 683.14	806 916 548.18	-1.671*
Exports: FBTWP	42	77	-38 387 870.18	37 397 969.97	-1.026	42	42	-3 970 707 984.86	3 411 721 987.32	-1.164
Exports: EI	42	78	881 613 532.10	790 814 046.17	1.115	42	42	-6 003 267 710.96	5 264 199 323.02	-1.140
Exports: CPR	42	79	-5 497 393.53	20 352 500.73	-0.270	42	41	-1 878 607 403.07	1 541 179 645.37	-1.219
Exports: TALF	42	80	-463 722 562.10	300 229 817.47	-1.545	42	42	-4 903 715 537.14	2 905 974 663.85	-1.687*
Exports: ISOM	42	76	21 374 626.02	46 285 060.64	0.462	42	40	-4 209 206 396.67	3 731 848 059.15	-1.128
Exports: METE	42	81	477 426 668.76	490 656 357.05	0.973	42	43	-6 950 374 697.29	5 947 422 743.97	-1.169
Exports: OI	42	81	-69 508 795.19	43 172 242.56	-1.610	42	43	-959 197 964.93	491 908 334.73	-1.950*

Critical values $Z(\alpha = 0.05) = 1.96$; $Z(\alpha = 0.1) = 1.64$, ** 5%, * 10%. Matching Variables: landlocked, LI, LMI, Majority Christian, Majority Muslim Distance (Weighted, in logs), Real GDP (logs), Distance squared, Real GDP squared, LI × Real GDP, LMI × Real GDP, UMI × Real GDP. Bias-adj Variables: landlocked, LI, LMI, Majority Christian, Majority Muslim Distance (Weighted, in logs), Real GDP (logs), Distance squared, Real GDP squared, LI × Real GDP, LMI × Real GDP, UMI × Real GDP. Exact matching done on LI, LMI, Majority Christian and Majority Muslim. ^{a}: Covariates used in estimating the propensity score is used here for comparison; ^{b}: Additional covariates — land and capital per worker as well as human capital are included and are also included in the bias–adjustment. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Table 4.13: Exact Nearest Neighbour matching based on Abadie and Imbens (2011) & Abadie et al.'s (2001) (Always AGOA) Mahalanobis metric

	Model A: Covariates based on propensity score[a]					Model B: With additional covariates[b]				
Outcome	# Treated	# Control	ATT	Std. Error	Z-statistic	# Treated	# Control	ATT	Std. Error	Z-statistic
Exports	29	81	-217 044 409.38	1 502 348 476.64	-0.144	29	49	-3 492 490 355.81	14 200 817 785.02	-0.246
Export Share	29	81	0.14	0.11	1.254	29	49	0.01	0.17	0.044
Exports (2002 - 1997)	29	74	-54 398 369.00	574 799 113.14	-0.095	29	43	-1 936 971 060.71	3 837 844 427.83	-0.505
Exports (2005 - 1997)	29	74	646 761 090.67	2 359 331 521.86	0.274	29	43	-5 062 933 790.12	8 911 334 284.44	-0.568
Exports (2007 - 1997)	29	74	2 943 371 168.00	5 382 187 338.09	0.547	29	43	-6 879 414 000.94	9 631 857 945.65	-0.714
Exports (2010 - 1997)	29	74	4 317 682 240.00	8 994 848 972.78	0.480	29	43	-8 420 804 306.82	7 884 636 115.39	-1.068
Exports: AMDS	29	80	-341 157 516.52	110 782 173.46	-3.080**	29	48	-521 955 716.57	578 952 429.21	-0.902
Exports: FBTWP	29	79	-90 311 266.98	47 570 994.43	-1.898*	29	48	-60 679 337.14	2 104 241 534.54	-0.029
Exports: EI	29	78	1 279 884 424.52	1 012 528 037.98	1.264	29	48	164 526 825.90	3 269 415 346.11	0.050
Exports: CPR	29	80	-38 727 771.55	24 941 239.21	-1.553	29	48	-52 212 404.95	940 020 993.70	-0.056
Exports: TALF	29	80	-818 068 256.17	357 088 389.60	-2.291**	29	48	-2 520 202 150.10	1 637 940 883.46	-1.539
Exports: ISOM	29	77	10 364 287.70	55 351 264.71	0.187	29	46	-352 373 283.20	2 471 735 482.21	-0.143
Exports: METE	29	81	117 966 841.38	663 818 322.87	0.178	29	49	-72 086 142.48	3 626 766 527.27	-0.020
Exports: OI	29	81	-295 585 650.10	84 284 715.40	-3.507**	29	49	-501 053 644.19	343 315 644.81	-1.459

Critical values $Z(\alpha = 0.05) = 1.96$; $Z(\alpha = 0.1) = 1.64$, ** 5%, * 10%. Matching Variables: landlocked, LI, LMI, Majority Christian, Majority Muslim Distance (Weighted, in logs), Real GDP (logs), Distance squared, Real GDP squared, LI × Real GDP, LMI × Real GDP, UMI × Real GDP. Bias-adj Variables: landlocked, LI, LMI, Majority Christian, Majority Muslim Distance (Weighted, in logs), Real GDP (logs), Distance squared, Real GDP squared, LI × Real GDP, LMI × Real GDP, UMI × Real GDP. Exact matching done on LI, LMI, Majority Christian and Majority Muslim. ^{a}: Covariates used in estimating the propensity score is used here for comparison; ^{b}: Additional covariates — land and capital per worker as well as human capital are included and are also included in the bias–adjustment. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Table 4.14: Exact Nearest Neighbour matching based on Abadie and Imbens (2011) & Abadie et al.'s (2001) (AGOA & EBA preferences) Mahalanobis metric

	Model A: Covariates based on propensity score[a]					Model B: With additional covariates[b]				
Outcome	# Treated	# Control	ATT	Std. Error	Z-statistic	# Treated	# Control	ATT	Std. Error	Z-statistic
Exports	17	81	3 306 558 490.35	2 125 392 902.98	1.556	17	51	273 192 570.18	696 814 782.44	0.392
Export Share	17	81	0.18	0.16	1.164	17	51	0.21	0.13	1.565
Exports (2002 - 1997)	17	77	690 825 666.67	595 750 976.45	1.160	17	48	-86 520 784.00	248 541 158.15	-0.348
Exports (2005 - 1997)	17	77	170 222 498.13	780 047 933.08	0.218	17	48	-214 481 926.40	377 315 077.51	-0.568
Exports (2007 - 1997)	17	77	937 469 677.87	1 220 415 331.05	0.768	17	48	-361 668 038.40	546 864 845.66	-0.661
Exports (2010 - 1997)	17	77	-215 200 213.33	1 238 608 453.19	-0.174	17	48	-630 701 215.20	431 636 856.81	-1.461
Exports: AMDS	17	80	58 616 646.09	42 711 638.46	1.372	17	50	8 888 929.82	39 917 936.69	0.223
Exports: FBTWP	17	79	6 859 301.38	12 364 450.22	0.555	17	50	16 828 680.41	13 507 916.40	1.246
Exports: EI	17	78	668 057 848.94	619 761 674.69	1.078	17	50	-5 233 638.73	24 242 472.00	-0.216
Exports: CPR	17	80	29 231 881.85	25 721 196.30	1.136	17	50	2 077 518.16	5 308 573.97	0.391
Exports: TALF	17	80	1 185 322 047.29	986 301 694.83	1.202	17	50	220 774 504.73	614 022 438.43	0.360
Exports: ISOM	17	77	27 344 216.95	18 455 655.15	1.482	17	48	27 025 892.40	23 292 618.30	1.160
Exports: METE	17	81	1 016 573 160.47	941 535 029.73	1.080	17	51	1 044 522.43	708 277.75	1.475
Exports: OI	17	81	177 434 496.00	141 933 789.79	1.250	17	51	2 088 259.67	3 834 447.34	0.545

Critical values $Z(\alpha = 0.05) = 1.96$; $Z(\alpha = 0.1) = 1.64$, ** 5%, * 10%. Matching Variables: landlocked, LI, LMI, Majority Christian, Majority Muslim Distance (Weighted, in logs), Real GDP (logs), Distance squared, Real GDP squared, LI × Real GDP, LMI × Real GDP, UMI × Real GDP. Bias-adj Variables: landlocked, LI, LMI, Majority Christian, Majority Muslim Distance (Weighted, in logs), Real GDP (logs), Distance squared, Real GDP squared, LI × Real GDP, LMI × Real GDP, UMI × Real GDP. Exact matching done on LI, LMI, Majority Christian and Majority Muslim. [a]: Covariates used in estimating the propensity score is used here for comparison; [b]: Additional covariates — land and capital per worker as well as human capital are included and are also included in the bias–adjustment. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

The remaining tables (4.15 & 4.16) in this section provide our sensitivity results. The results shown are for the 'all AGOA' and 'always AGOA' treatment groups. The sensitivity analysis is based on what Nannicini (2007) calls the *"killer confounders"*. We simulate large selection and output effect values to see whether the ATT estimates are driven to zero. In the tables below we assume the following values of the parameters used in simulating the confounder U: $p_{11} = 0.8$, $p_{10} = 0.8$, $p_{01} = 0.6$, $p_{00} = 0.1$. This gives us $p_{1.} = 0.8$ and $p_{0.} = [0.17, 0.46]$. Our output (d) and selection (s) effects are $d = p_{01} - p_{00} = 0.6 - 0.1 = 0.5$ and $s = p_{1.} - p_{0.} = 0.8 - 0.17 = 0.63; 0.8 - 0.46 = 0.46$. These output and selection effects are high and after conditioning on U (the unobservable variable) and W (the observable variables) yields the selection and output estimates shown under their respective columns in the tables. The selection effect reported in the table is calculated as the average odds ratio of U based on $Pr(T = 1|U, W)$. T is the treatment, W is the observable vector of covariates and U is the unobserved (or confounding) factor. The selection effect is therefore

$$\Lambda = \frac{Pr(T = 1|U = 1, W)}{Pr(T = 0|U = 1, W)} / \frac{Pr(T = 1|U = 0, W)}{Pr(T = 0|U = 0, W)}.$$

The output effect is calculated as

$$\Gamma = \frac{Pr(I(Y > \bar{Y}) = 1|T = 0, U = 1, W)}{Pr(I(Y > \bar{Y}) = 0|T = 0, U = 1, W)} / \frac{Pr(I(Y > \bar{Y}) = 1|T = 0, U = 0, W)}{Pr(I(Y > \bar{Y}) = 0|T = 0, U = 0, W)}.$$

The output effect ranges between 16.4 and 18.2 in table (4.15) while the selection effects are between 9.6 and 23.5. These large selection and output effects do not drive the estimated ATT close to zero which implies that much larger selection and output effects than that reported in the table are required to drive the ATT estimates to zero. For instance, in spite of the rather large effects, U explains 50% ([858.4 million - 428.7 million]/858.4 million) of the 2002 difference-in-differences baseline estimate reported in model A of table (4.9). On the contrary, the estimates reported in table (4.1) which are between \$ 361 million and \$ 486.4 million are much closer to the ATT estimate based on the potential confounders simulated.

In table (4.16) we have similar estimates and very large selection and output effects. The output effect varies between 15.99 and 18.9 while the selection effect varies between 11 and 25.7. In terms of the difference-in-differences estimate for 2002, the simulated confounder explains 61.6% ([948.1 million -363.6 million]/948.1 million) of the baseline estimate reported in table (4.10). Quite contrary to the previous table the ATT estimates for 2005 and 2010 have fallen rather than risen above the 2002 values. The confounder explains 88% and 38.9% of the 2005 and 2010 baseline estimates in model A in table (4.10). However, these estimates in both models of the table are not significant. The simulation exercise shows that for most of the significant estimates, much larger values of the selection and output effects are required to have the unobserved variable explain all of the baseline estimate. This exercise thus, supports the robustness of the matching estimates[13].

[13] Tables (C.11 - C.16) present additional tables based on simulating the confounder based on the majority christian country dummy, low income country dummy and also the Rosenbaum sensitivity analysis.

Table 4.15: Sensitivity Analysis: All AGOA

Outcome	ATT	Output Effect (Γ)	Selection Effect (Λ)
Exports	-918 813 824.00	17.06	15.45
Export Share	0.01	17.40	9.64
Exports (2002 - 1997)	-428 744 736.00	16.77	12.75
Exports (2005 - 1997)	-342 771 680.00	16.73	12.87
Exports (2007 - 1997)	-418 388 448.00	16.60	13.56
Exports (2010 - 1997)	-741 396 416.00	16.75	12.58
Exports: AMDS	-124 871 808.00	17.29	15.58
Exports: FBTWP	-66 321 348.00	16.43	14.49
Exports: EI	539 518 400.00	16.45	15.70
Exports: CPR	-83 352 768.00	16.97	15.75
Exports: TALF	-742 025 152.00	17.04	15.73
Exports: ISOM	-65 693 728.00	16.72	14.54
Exports: METE	-325 135 456.00	18.24	23.48
Exports: OI	-102 425 184.00	18.00	20.97

The methods here are described in Ichino et al. (2006) and Nannicini (2007). 1000 replications are conducted. The binary transformation is based on the mean value of each outcome (Y). The simulation is based on the following assumptions of the confounder, $P_{11} = Pr(U = 1|I(Y > \bar{Y}) = 1, T = 1) = 0.80$; $P_{10} = Pr(U = 1|I(Y > \bar{Y}) = 1, T = 0) = 0.80$; $P_{01} = Pr(U = 1|I(Y > \bar{Y}) = 1, T = 0) = 0.60$; $P_{00} = Pr(U = 1|I(Y > \bar{Y}) = 0, T = 0) = 0.10$; $P_{1.} = Pr(U = 1|T = 1) = 0.80$; $P_{0.} = Pr(U = 1|T = 0) \equiv 0.17 \leftrightarrow 0.46$. The output effect is the average odds ratio of U based on a logit model of $Pr(I(Y > \bar{Y}) = 1|T = 0, U, W)$. The selection effect is the average odds ratio of U based on $Pr(T = 1|U, W)$. T is the treatment, W is the observable vector of covariates and U is the unobserved (or confounding) factors. Output effect $= \frac{Pr(I(Y>\bar{Y})=1|T=0,U=1,W)}{Pr(I(Y>\bar{Y})=0|T=0,U=1,W)} / \frac{Pr(I(Y>\bar{Y})=1|T=0,U=0,W)}{Pr(I(Y>\bar{Y})=0|T=0,U=0,W)}$. Selection effect $= \frac{Pr(T=1|U=1,W)}{Pr(T=0|U=1,W)} / \frac{Pr(T=1|U=0,W)}{Pr(T=0|U=0,W)}$.

Table 4.16: Sensitivity Analysis: Always in AGOA

Outcome	ATT	Output Effect (Γ)	Selection Effect (Λ)
Exports	-748016192.00	16.63	16.80
Export Share	0.04	17.84	11.04
Exports (2002 - 1997)	-457 082 944.00	15.99	14.06
Exports (2005 - 1997)	-29 936 260.00	16.69	14.00
Exports (2007 - 1997)	184 289 568.00	17.00	14.97
Exports (2010 - 1997)	-86 024 848.00	16.90	14.37
Exports: AMDS	-130 864 808.00	16.57	16.70
Exports: FBTWP	-100 010 288.00	17.37	16.14
Exports: EI	813 692 928.00	16.66	17.46
Exports: CPR	-106 409 104.00	16.56	18.27
Exports: TALF	-680 370 304.00	16.92	16.82
Exports: ISOM	-86 093 176.00	16.64	16.50
Exports: METE	-435 430 368.00	18.87	25.73
Exports: OI	-97 720 536.00	17.03	23.29

The methods here are described in Ichino et al. (2006) and Nannicini (2007). 1000 replications are conducted. The binary transformation is based on the mean value of each outcome (Y). The simulation is based on the following assumptions of the confounder, $P_{11} = Pr(U = 1|I(Y > \bar{Y}) = 1, T = 1) = 0.80$; $P_{10} = Pr(U = 1|I(Y > \bar{Y}) = 1, T = 0) = 0.80$; $P_{01} = Pr(U = 1|I(Y > \bar{Y}) = 1, T = 0) = 0.60$; $P_{00} = Pr(U = 1|I(Y > \bar{Y}) = 0, T = 0) = 0.10$; $P_{1.} = Pr(U = 1|T = 1) = 0.80$; $P_{0.} = Pr(U = 1|T = 0) \equiv 0.17 \leftrightarrow 0.46$. The output effect is the average odds ratio of U based on a logit model of $Pr(I(Y > \bar{Y}) = 1|T = 0, U, W)$. The selection effect is the average odds ratio of U based on $Pr(T = 1|U, W)$. T is the treatment, W is the observable vector of covariates and U is the unobserved (or confounding) factors. Output effect $= \frac{Pr(I(Y>\bar{Y})=1|T=0,U=1,W)}{Pr(I(Y>\bar{Y})=0|T=0,U=1,W)} / \frac{Pr(I(Y>\bar{Y})=1|T=0,U=0,W)}{Pr(I(Y>\bar{Y})=0|T=0,U=0,W)}$. Selection effect $= \frac{Pr(T=1|U=1,W)}{Pr(T=0|U=1,W)} / \frac{Pr(T=1|U=0,W)}{Pr(T=0|U=0,W)}$.

4.3.3 An alternative approach: comparative case studies using the synthetic control method (SCM)

The results based on the propensity score and exact nearest neighbour matching have provided a negative impact of the AGOA preference on the beneficiaries. In the previous section, the averaging of our outcomes in calculating the ATT estimates led to non-significant estimates and in some cases provided significant results that showed a negative impact of AGOA on some key AGOA exports. We attributed these results to the crowding out occurring within the treatment groups and the product clusters. In this section, we hope to clarify and further analyse whether a different approach based on case study analyses can provide us with useful answers to our question posed at the beginning of this chapter, "has AGOA increased the exports of recipients compared to non-recipient countries?" We find that the synthetic control approach undertaken in this section does a better job of showing the trends in exports and providing us an answer to this question on a country by country basis. Nonetheless, unlike the previous sections, we are able to study the time trends of exports for each AGOA recipient and observe the trends for our counter-factual countries[14]. Furthermore, we focus on oil and non-oil exports to determine whether isolating oil exports from the EI cluster would lead to significant estimates. In the appendix to this chapter (see figure C.8), we also show results for apparel and textile products to determine if the exclusion of leather and footwear products from the TALF cluster would yield a positive impact.

In this section, we use an alternative approach at matching the countries. The results above as mentioned earlier, are probably driven by the crowding out effects due to averaging our outcomes over the sample period. For instance, the outcome is averaged over the post-AGOA period, however, not all AGOA countries received their preferential status in the same year. Secondly, averaging of the outcomes does not provide an adequate way of comparing the outcomes over time. We hope to overcome these drawbacks by using the synthetic control method of Abadie and Gardeazabal (2003) and described in Abadie et al. (2010) and Abadie et al. (2012)[15].

Figures (4.1)–(4.4) provide an idea of the trends in total exports and non-oil exports for the AGOA countries and the pool of control countries. We do this to show the similarities and differences in the trends of exports for the treated countries and the control countries. In figure (4.1), the average non-oil and total exports of the control pool lies above the average exports for the AGOA countries. This gives support to our earlier assertion of the crowding out occurring in our average matching estimates. In order to show that there are a number of large exporters among the AGOA group of countries we show selected countries based on the top five AGOA exporters (selections made from ranking countries based on their average non-oil and total exports to the USA for the 2000 – 2012 period). In figure (4.2), we find South Africa to have the highest non-oil exports over the 2000–2012 period compared to the average of the pool of control countries and remaining AGOA countries. After including oil exports, we find that, South Africa is no longer the highest exporter. Nigeria now becomes the largest exporter to the USA—showing how oil exports makes a difference in the ranking of the top exporters of AGOA. Also, Angola after 2004 rises above South Africa in terms of total exports. All these three countries lie above the mean exports of the control pool for almost the entire sample period. Mauritius and Kenya ranked among the top five (see figure [4.4] for the ranking of the top five and bottom five exporters within our sample) total non-oil exporters lie below the control pool in both panels while Nigeria and Angola lie below the control pool in only panel A.

[14]In this section, we refer to the constructed counter-factual as the synthetic country. Thus, if Angola is our treated country our counter-factual comparison is done with what Abadie et al. (2010, 2012, 2014) refers to as *synthetic* Angola in our case. Also following the authors we refer to our control countries as the *pool*. These terms are however, used interchangeably with our previous terms that is, counter-factual, control and reference countries.

[15]Estimations are carried out in Stata using the *Synth* package provided by the authors—Abadie et al. (2010) and Abadie et al. (2014).

In figure (4.3), we provide further evidence of the trend in total exports. We show the trends in four of the major AGOA oil exporters and compare these countries to selected countries from the control pool. The seven countries (Algeria, Bahrain, Egypt, Malaysia, Oman, Saudi Arabia, and Venezuela) from the control pool were part of the counter-factual trends shown in the synthetic control application for Angola, Republic of Congo, Gabon, and Nigeria later in this section. The aim of this figure is to convince the reader that the choice of countries for our treated cases have similar export trends to the four AGOA countries mentioned above. Another reason is also to justify the positive impact of the preference we report below.

Figure (4.4) provides information on the largest and smallest AGOA exporters. As can be seen from the graph, the mean exports in panel A for non-oil exports show South Africa to be the largest exporter in this category. South Africa's exports are 22.1, 28.3, 44.2, and 70.8 times the mean exports of the next ranked countries—that is, Kenya, Mauritius, Ghana and Nigeria. Given the very low exports of the bottom five which are less than $ 4 million, we can see the large disparity in exports by AGOA countries. We note that, this provides further motivation for undertaking the quantile analysis in the next chapter. Taking the mean exports across the AGOA countries would lead to a significantly lower mean export value for all the AGOA countries as visible in figure (4.4) in this section.

Including oil exports changes the ranking of the top five countries. Kenya, Mauritius and Ghana no longer appear in the top five ranked countries. Nigeria on the contrary becomes the top ranked exporter. We also observe new members, namely, Angola, Gabon and Republic of Congo. We note that, the bottom five does not change significantly. Benin is the only country that moves up one rank (but two from its position in panel A) above the bottom five while Burundi drops down by one rank to become a member of the bottom five. Nigeria's exports are 2.3, 3.2, 10.1 and 10.6 times the exports of Angola, South Africa, Gabon and Republic of Congo. This compared to panel A where we had South Africa exporting 22.1–70.8 times the exports of the remaining top five countries—shows a tighter distribution of exports among the top five in the case of panel B. These countries are the largest AGOA exporters and their exports dominates the exports of all the remaining countries. We particularly view this as problematic for analyses that are based on mean estimators. This disparity in exports would either raise or lower the mean impact. In our case, the mean impact is more likely to be understated given that majority of the AGOA countries are found at the lower end of the export distribution. This provides further support for our earlier assertion about the crowding out effects. We next outline the synthetic control method (SCM).

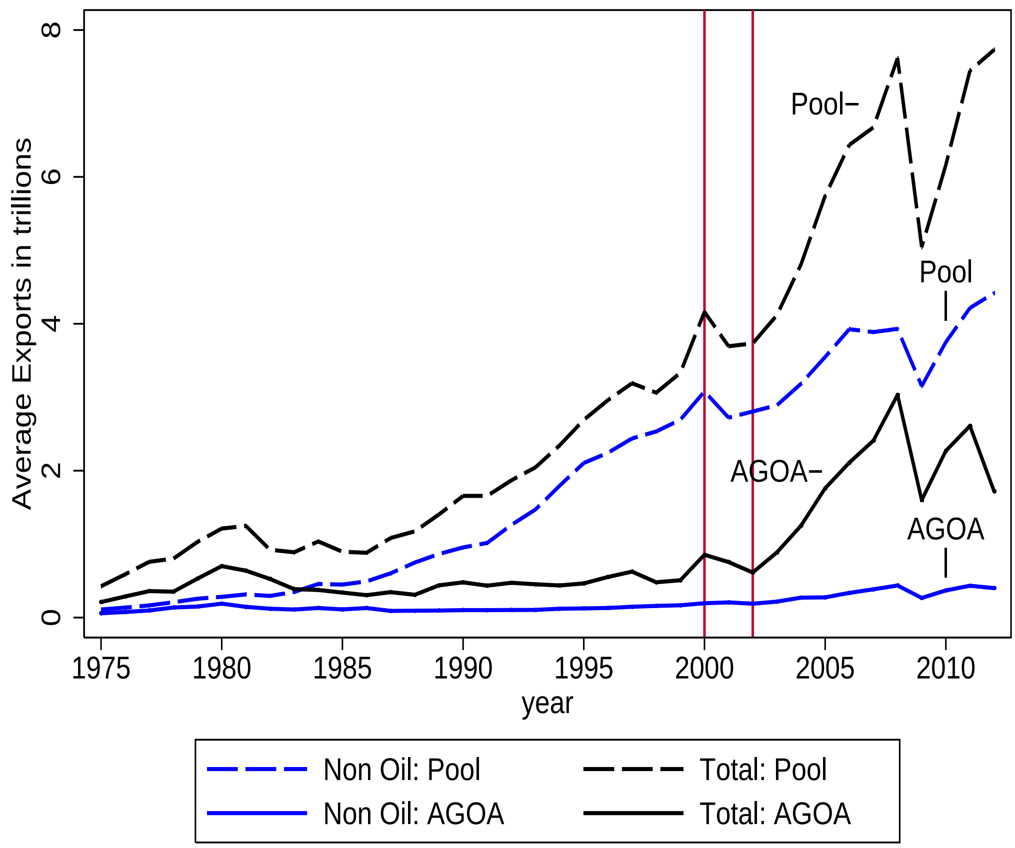
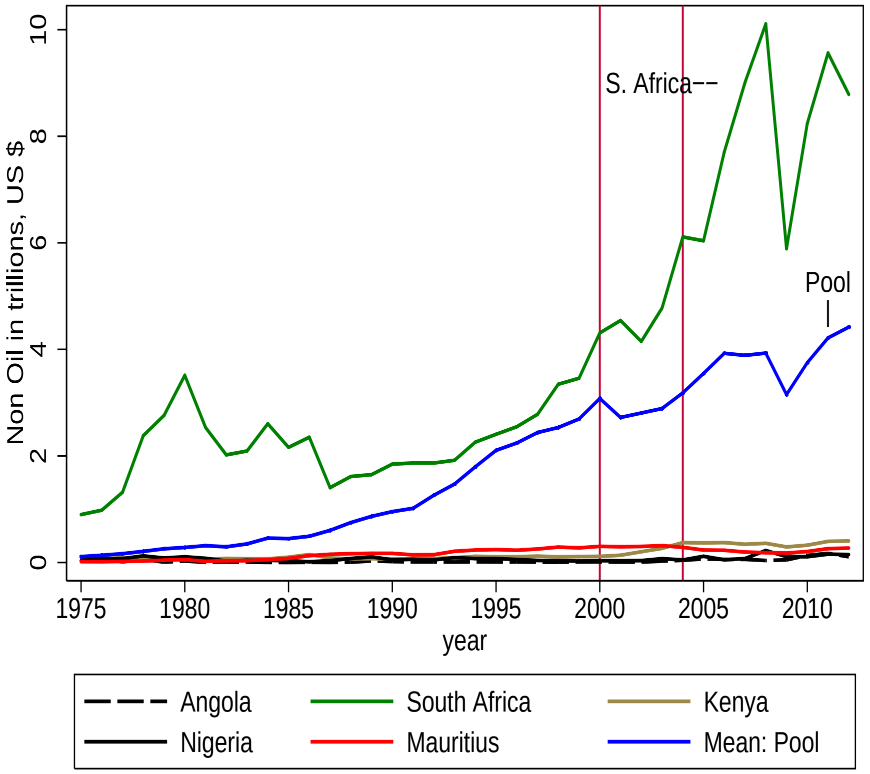
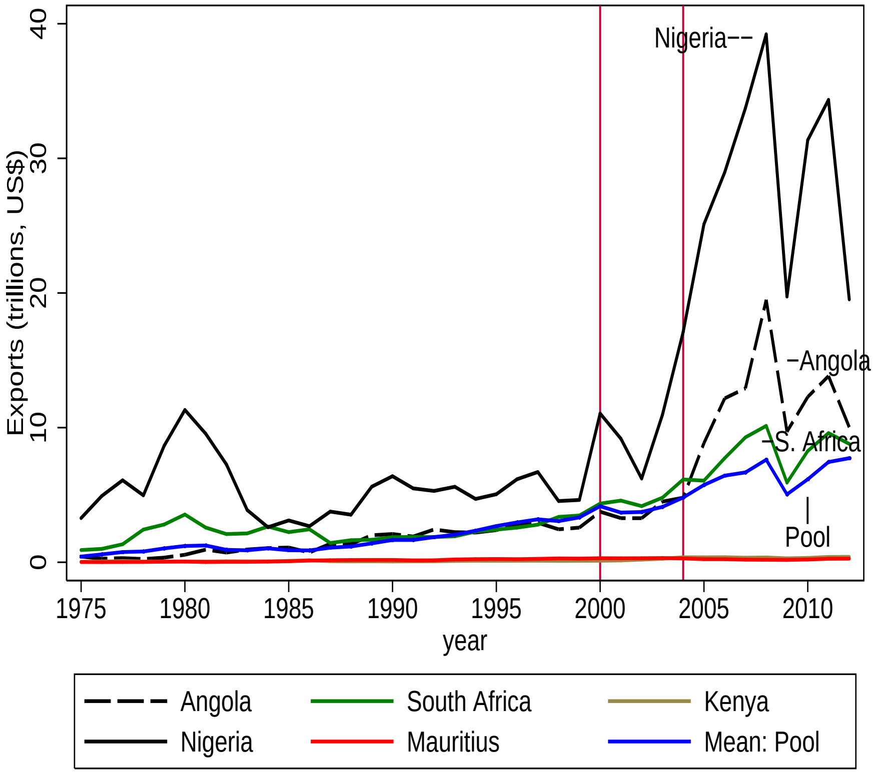


Figure 4.1: *Trends in Exports: AGOA and Control country averages*



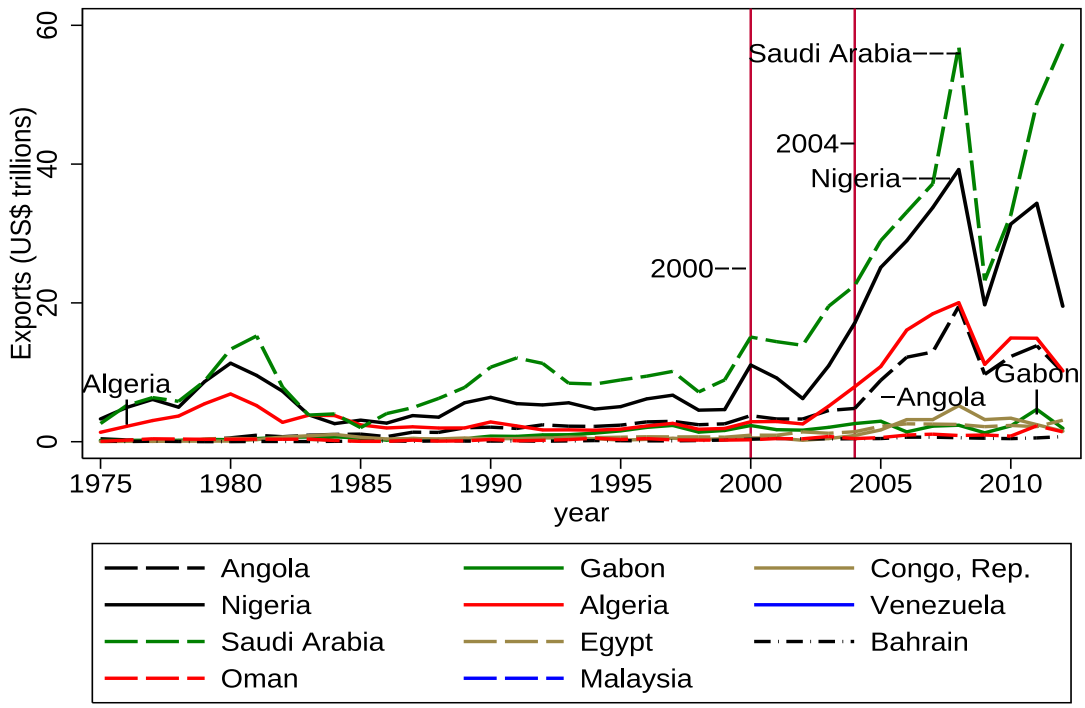
(a) Non-Oil



(b) Total

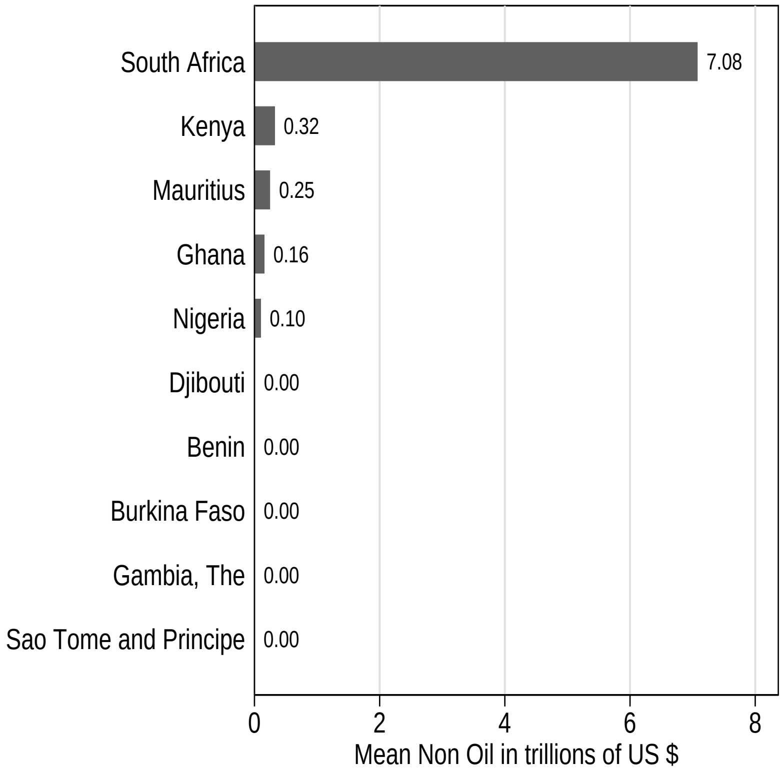
Pool is based on an average of 38 developing and middle income countries.

Figure 4.2: *Trends in exports: Selected top AGOA exporters and average of pool of control countries, 1975 – 2012*

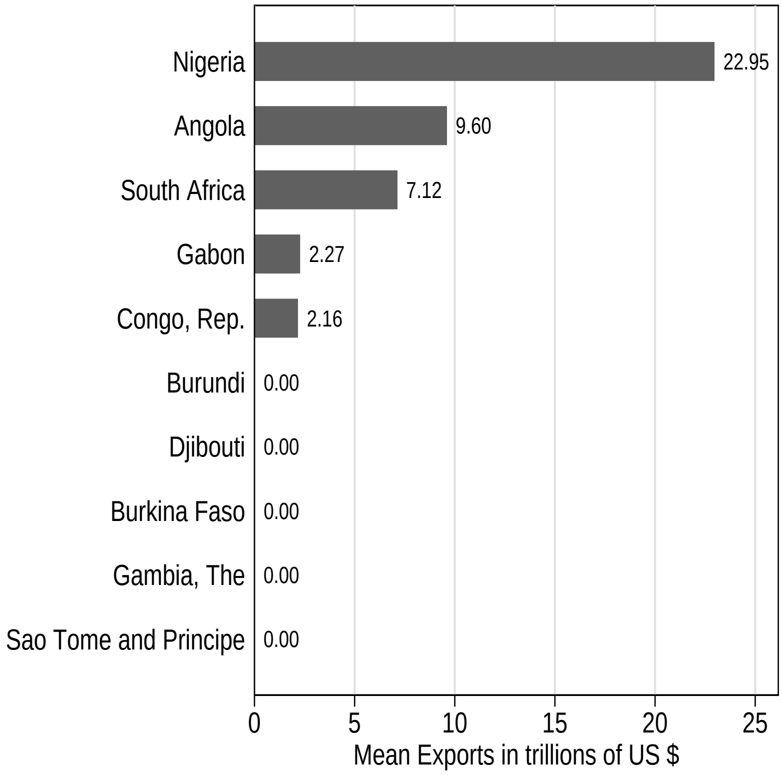


11 countries are are shown in the figure above these include four treated countries: Angola, Congo Rep., Gabon & Nigeria and 7 control countries from the counter-factual pool: Algeria, Bahrain, Egypt, Malaysia, Oman, Saudi Arabia & Venezuela. The 7 counter-factual countries chosen have contributed to the synthetic counter-parts of these countries in a few cases. See appendix tables (C.22 & C.23).

Figure 4.3: *Trends in Exports: Selected treated and control countries*



(a) Non-Oil



(b) Total

Even though the diagrams are based on the mean exports for 2000 - 2012 calculating the mean exports based on the particular years each country has been provided with AGOA still leaves the bottom and top 5 unchanged. Although a slight re-ordering of countries in the middle of the distribution occurs. Exports less than $ 4 million appear in the graph above as 0.00

Figure 4.4: *Top & bottom Five countries: 2000 – 2012 Average*

Methods

Abadie et al. (2010) in motivating the choice of synthetic control studies in comparative case studies analysis provide the following insights.

> Social scientists are often interested in the effects of events or policy interventions that take place at an aggregate level and affect aggregate entities, such as firms, schools, or geographic or administrative areas (countries, regions, cities, etc.). To estimate the effects of these events or interventions, researchers often use comparative case studies (Abadie et al., 2010, 493).

With synthetic control methods we compare the time series of aggregate exports for the treated and control country cases. Abadie et al. (2010) suggests that synthetic control methods are data driven thereby removing the influence of the researchers choice in selecting control countries[16]. Much of the analysis is based on data available for the control and treated unit to reduce the discretion and subjectivity of the researcher (Abadie et al., 2010). The SCM allows control units to be combined in comparison to the treated unit—rather than a comparison with a single control unit (Abadie et al., 2010). Examples of studies using a combination of control units include Abadie et al. (2012); Abadie and Gardeazabal (2003); Card (1990) and Cavallo et al. (2013). There has been an increase in the use of SCM since the initial publication by Abadie and Gardeazabal (2003). Abadie and Gardeazabal (2003) combine regions of Spain in comparison to the Basque region—to determine whether economic growth in the Basque region would have obtained in the absence of terrorism. Abadie et al. (2010) use 38 USA states to study the effect of a tobacco control programme initiated in California in 1998. Abadie et al. (2012) analyse the economic effects of German reunification on West Germany using 16 OECD member countries as the control countries. Also, Cavallo et al. (2013) is a recent application of the SCM method to natural disasters. They estimate the causal impact of natural disasters on economic growth—where the cases selected are based on the 75th, 90th and 99th percentile of the distribution of people killed in the world due to natural disasters. Given the increased interest in the SCM for aggregate analysis we have adopted it here as a further check on our results and to aid us in providing more definitive results of the impact of AGOA.

An advantage of the SCM is that, it can be applied to both micro and macro data as well as be performed on a few control units (Abadie et al., 2010). The SCM is a case study approach thus, we need only one treated country to perform the analysis. We use the SCM method for selected AGOA countries to estimate the level of exports to the USA that would have occurred in the absence of AGOA. It is possible to carry out some falsification tests or placebo tests to determine the level of confidence we can have in our estimates (see for example, Abadie et al., 2010, 2012). This process can be done by either changing the actual year of AGOA provision or repeatedly assigning each control country within the control pool the AGOA treatment and comparing their exports to the counter-factual. Evidence obtained that show AGOA impacts much higher in magnitude relative to

[16]The earlier matching analysis is also data driven given that the researcher's choice of control countries are based on either on the propensity score or exact covariate matching. Although, in the propensity score matching approach, the bandwidth or caliper value chosen can determine which countries are included in the counter-factual. In spite of this, the choice of the counter-factual is based on the data. The data driven nature was essentially to compare the SCM to qualitative methods—to provide a more robust alternative to case study analysis whereby the researcher hand-picks comparative cases to analyse.

our cases would imply that our initial estimates may be poorly determined (for example, Abadie et al., 2010, 2012).

We discard all Caribbean Basin, high income, and newly industrialised countries from the control pool. This leaves us with 38 control countries in the control pool[17]. The Caribbean Basin countries have the Caribbean Basin Trade Protection Act (CBTPA) preferences which are similar to the AGOA preferences hence their exclusion. The remaining countries excluded have high incomes and are more industrialised than the African countries. Their exports also contain more sophisticated manufactures unlike the African countries. A question that can be answered by this approach is, "how has exports evolved in the treated countries after their AGOA status?" We are still able to answer the question, "whether there has been an impact of AGOA." In the SCM, we find among the pool of control countries those countries that are able to replicate the pre-AGOA exports of the treated country using algorithms developed by Abadie et al. (2010, 2012); Abadie and Gardeazabal (2003). Given that pre-AGOA trends are similar, the year of AGOA provision becomes the point where any departure observed between the treated and counter-factual country becomes the policy effect. The impact then becomes the difference between exports to the USA by the treated country and its counter-factual. In the SCM terminology the counter-factual is referred to as the synthetic country. For instance, if Nigeria is our treated country then the counter-factual is referred to as synthetic Nigeria—hence comparison is made between Nigeria and the constructed synthetic Nigeria. In this case, synthetic Nigeria could be obtained by a single country in the control pool or a combination of countries within the pool. The SCM algorithm allows this possibility—allowing one to obtain for example Venezuela, Saudi Arabia, Bangladesh and probably Malaysia providing weights of 50%, 20%, 20% and 10% to synthetic Nigeria that replicates the exports of Nigeria. The percentages provided in the preceding are just an example, however, such combinations of countries that reliably reproduce the exports of Nigeria can be found.

Abadie et al. (2010, 2012) in a footnote, note that where there are several treated units it is possible to aggregate the treated units exposed to the intervention or apply the SCM to each case. We choose the latter given our experience in the previous section and the fact that few countries have relatively large exports to the USA compared to the remaining treated units. Our approach in this case, allows us to focus on each selected country and provide a comparison of each treated country's export series to its synthetic counterpart.

In the SCM the use of longitudinal data allows us to control for time-invariant unobserved variables which proves to be an advantage of this method (Abadie et al., 2010, 2012; Abadie and Gardeazabal, 2003; Cavallo et al., 2013). The analysis requires that countries that are not provided AGOA (control countries) provide the trend in exports for the AGOA countries after the provision of AGOA—this enables us to estimate what exports would have been for the AGOA countries (see for example, Cavallo et al., 2013, for natural disasters). This assumption is quite strong and is not easily satisfied (Cavallo et al., 2013). Identification in this case requires finding a country or weighted group of countries that have the same pre-AGOA export trends. This would likely strengthen the ability of the synthetic country to replicate the trends in exports of the treated

[17]The control countries are: Afghanistan, Algeria, Argentina, Bahrain, Bangladesh, Brunei, Comoros, Egypt, Fiji, India, Indonesia, Iran, Jordan, Kuwait, Lao PDR, Lebanon, Macao, Malaysia, Mongolia, Morocco, Nepal, New Caledonia, Oman, Pakistan, Papua New Guinea, Paraguay, Philippines, Qatar, Saudi Arabia, Singapore, Solomon Islands, Sri Lanka, Syria, Thailand, Tunisia, United Arab Emirates, Uruguay, Venezuela.

country in the absence of AGOA. This group of countries become the counter-factual or in SCM terminology the synthetic country and provide an avenue for obtaining a causal impact of AGOA. This approach unlike the fixed effects model, allows the unobservable factors to vary with time (Abadie et al., 2010, 2012; Cavallo et al., 2013). This is a strong point for our analysis given that there may be unobservable factors varying with time that may be affecting our treated countries. In predicting exports we draw on gravity type variables to replicate the treated country's export series. Our model includes English, Spanish and landlocked dummies; logs of weighted distance, area and gross domestic product (gdp). Since the algorithm includes unobservable factors that are constant and vary with time we believe this model would be able to predict exports of our selected cases.

Let $J+1$ be the treated country of interest and the control countries, T be the time period[18]. We consider $J = 1$ to be the selected treated country while the remaining $J + 1$ countries form the control pool. We consider two time periods, T_0 to be the pre-AGOA period ($1 \leq T_0 < T$) and $T_0 + 1$ to T indicates the post-AGOA period. We denote Y_{it}^N to be exports observed for country i at time t prior to AGOA—T_0. Also, let Y_{it}^I be exports observed for unit i at time t post-AGOA—$T_0 + 1$. One assumption made by Abadie et al. (2010); Abadie and Gardeazabal (2003) is that the provision of treatment does not affect the outcome prior to its implementation in time T_0—implying that $Y_{it}^I = Y_{it}^N$ during this period[19]. We can define $\alpha_{it} = Y_{it}^I - Y_{it}^N$ to be the impact of AGOA for country i at time t. Let D_{it} be a dummy variable taking the value one if country i is provided AGOA at time t and zero otherwise.

$$Y_{it} = Y_{it}^N + \alpha_{it} D_{it}.$$

Since we consider the first country to be provided with AGOA and in period T_0+1 to T our dummy variable is,

$$D_{it} = \begin{cases} 1 & \text{if} \quad i = 1 \text{ and } t > T_0 \\ 0 & \quad otherwise \end{cases}$$

Our exercise requires the estimation of $(\alpha_{1T_0+1}, \ldots, \alpha_{1T})$. With $t > T_0$ we have

$$\alpha_{1t} = Y_{1t}^I - Y_{1t}^N = Y_{1t} - Y_{1t}^N.$$

Since Y_{1t}^I is not observed it has to be estimated and this can be done with the factor model proposed by Abadie et al. (2010)

$$Y_{it}^N = \delta_t + \theta_t Z_i + \lambda_t \mu_i + \varepsilon_{it}, \tag{4.5}$$

where δ_t is not known and is a common factor with fixed factor loadings across countries, Z_i is a vector of covariates in the pre-AGOA period, θ_t is a vector of unknown parameters, λ_t is a

[18]Our discussion on the methods draws heavily on Abadie et al. (2010, 2012); Abadie and Gardeazabal (2003) and we use notation present in Abadie et al. (2010); Abadie and Gardeazabal (2003).

[19]Abadie et al. (2010) note that, it is possible to observe an impact prior to the treatment being provided—the *anticipation effects*. We do observe a few instances of this in our analysis below. They recommend that it is possible to redefine period T_0 to a year where the reaction to the intervention is observed. Another implicit assumption in the analysis is that there are no feedback effects or "interference" among the units—that is receiving AGOA status does not affect the exports of the control countries(Abadie et al., 2010)

vector of unobserved common factors, μ_i is a vector of unknown factor loadings and ε is the iid unobserved country level shocks. Suppose there is a vector of weights $W = (w_2, \ldots, w_{J+1})'$ where $0 \leq w_j \leq 1$ for $j = 2, \ldots, J+1$ and the sum of weights is equal to one (that is, $w_2 + \ldots + w_{J+1} = 1$). Then each positive value of our vector W can be a potential candidate of the synthetic country—the positive values represent a weighted average of the control countries. This then provides us with the value of the export outcome as the sum of the following quantities described above in equation (4.5)

$$\sum_{j=2}^{J+1} w_j Y_{jt} = \delta_t + \theta_t \sum_{j=2}^{J+1} w_j Z_j + \lambda_t \sum_{j=2}^{J+1} w_j \mu_j + \sum_{j=2}^{J+1} w_j \varepsilon_{jt}.$$

We thus obtain the following equations of the export outcomes given that there exist weights w_i^* for our $J+1$ controls. However, if we are unable to find such weights for the equality in equation (4.6) to hold—an approximation of the relationship is acceptable. Abadie et al. (2010) notes that this is often the case in practise.

$$\begin{aligned} &\textstyle\sum_{j=2}^{J+1} w_j^* Y_{j1} = Y_{11}, \qquad \sum_{j=2}^{J+1} w_j^* Y_{j2} = Y_{12}, \ \ldots, \\ &\textstyle\sum_{j=2}^{J+1} w_j^* Y_{jT_0} = Y_{1T_0}, \quad \text{and } \sum_{j=2}^{J+1} w_j^* Z_j = Z_1, \\ &\textstyle\sum_{j=2}^{J+1} w_j^* \mu_j = \mu_1. \end{aligned} \tag{4.6}$$

As long as equation (4.6) holds in approximate terms we would obtain an unbiased estimate of Y_{1t}^N. As a result Abadie et al. (2010) notes that in the approximate case the factor model specified in equation (4.5) above can find Z_1 and the set of pre-AGOA export outcomes (that is, $Y_{11}, \ldots, Y_{T_0}$) as long as the relationships for Z_1 and μ_1 hold approximately in equation (4.6).

In implementing the estimator we chose the vector W^* that minimises the distance between the pre-AGOA and the synthetic control covariates—X_1 and $X_0 W$. This is formulated as

$$\text{arg min } \mid X_1 - X_0 W \mid = (X_1 - X_0 W)' V (X_1 - X_0 W)$$

subject to $w_2 \geq 0, \ldots, w_{J+1} \geq 0$ and $w_2 + \ldots + w_{J+1} = 1$. Where V is a diagonal matrix with positive diagonal elements that show the importance of the various export covariates specified in the factor model. The post-AGOA export outcomes are then obtained as the difference between the treated and synthetic country—$Y_1 - Y_0 W^*$ at time $t \geq T_0$. Our synthetic control estimate of the impact of AGOA in the post-AGOA period is then,

$$Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt}.$$

Where the variables are as defined earlier. The figures shown in the results section plot these annual estimates of the synthetic control estimates. Table (4.17) provides the short- and long-run estimates of the synthetic control method. We consider the estimates a year after the provision of AGOA as our short-run estimate. The long-run estimate is provided as the mean value for all periods in the sample after the provision of AGOA. Figures (4.5)–(4.7) provide the synthetic control estimates. Figures (4.8)–(4.13) provide evidence of our placebo treatments to show whether our synthetic estimates are within reasonable limits. In the appendix, we provide further figures and tables showing evidence of the pre-AGOA mean predictors, the random mean square prediction error (RMSPE) and the various weights for the selected countries from the pool that form the trends in the synthetic country (that is, the counter-factual).

Top five AGOA exporters

Figure (4.5) shows the trends in exports for the treated and synthetic countries. The effect of AGOA on exports to the USA is the difference between exports to the USA by the treated country and its synthetic counterpart after the enactment of AGOA. The SCM finds countries that match the trend in exports for the treated country before AGOA, thus, after the provision of AGOA any divergence in the export series can be interpreted as an impact of the AGOA preference. As much as possible a good approximation of exports by the treated country in the pre-AGOA period is given by the synthetic country if the export series follow the same path. In this analysis we track these changes in the export series after AGOA until 2012. We thus obtain annual estimates of the difference between the treated country and its synthetic country. In the figure we provide the estimates for the top five AGOA countries based on total exports (which includes oil exports). For each country we show the estimated trends for both total and non-oil exports. The first column of the figure shows total exports while the second column shows the result for non-oil exports. The vertical line in the the panels show when the AGOA preference was provided to each country.

In the case of Angola the pre-trends of AGOA for total exports are very similar (the predictors for the pre-AGOA period for Angola and synthetic Angola provide further support). After the provision of AGOA we observe that, the total exports of Angola stays above synthetic Angola for the rest of the period. This shows that AGOA had a positive impact on the total exports of Angola to the USA. In terms of non-oil exports we do observe a positive impact of AGOA even though both trends for Angola and synthetic Angola appear to intersect during the post-AGOA period. From the results, it appears that, the impact of AGOA is favourable even when oil exports are excluded—this can be seen by comparing the Angola and synthetic Angola export series. Table (4.17) shows that for both the short- and long-term Angola had much higher exports than synthetic Angola. For non-oil exports these are 257.2% and 110.7% for the short- and long-term respectively. That of total exports are 64.8% and 198.7% respectively. The exclusion of oil exports provides a rather large short-run impact for Angola. Over the entire post-AGOA period (2005–2012), the gap between the two is less than half the short-run impact. Looking at total exports we observe the reverse—the short-run impact is less than half the long-run impact. Indicating the long-term benefits of oil exports in the AGOA exports of Angola. For Angola, we find strong evidence of a positive impact of the AGOA preference.

The Republic of Congo does not immediately show a positive impact compared to synthetic Congo however, two years after the AGOA provision, the exports of Congo rise above that of its synthetic counterpart for the remainder of the period. At this point Congo begins to see the positive impact of the AGOA preference. The values in table (4.17) shows that, Congo has a lower short- and long-term export of non-oil products of -43.4% and -49.2% respectively. The long-term non-oil export impact is larger in magnitude. The shortfall in exports compared to synthetic Congo is reversed after including oil exports in the case of the mean exports over the 2001–2012 period. While the short-term impact shows Congo to be 41.2% lower than its synthetic counterpart it shows a large increase in exports relative to synthetic Congo over the entire post-AGOA period of 534.7%. This is the largest positive impact observed for the twelve countries analysed in this section. This is significantly larger than the 198.7% increase shown by Angola. One could argue that Congo has had more time under AGOA compared to Angola and this has probably helped it in raising its exports to the USA.

Gabon does not show any clear impact as the previous two countries. The trends for both total and non-oil exports tend to overlap in the post-AGOA period. However, table (4.17) shows that immediately after the provision of AGOA Gabon exported 48% and 4.3% lower non-oil and total exports. Including oil exports has reduced the negative impact of the preference. However, when we consider the mean impact from 2001–2012 it is 7.2% and 2.4% lower than synthetic Gabon for non-oil and total exports respectively. In this case, we find the long term impact to be smaller in magnitude than the immediate impact of the preference. This implies that over the period the difference between exports by Gabon and synthetic Gabon has become smaller and exports are now quite similar. The result shows that oil exports are key in any gains Gabon might obtain from exporting under the AGOA preference.

Nigeria the largest exporter (in terms of total exports) does not show a similar increase in its exports. One would have expected a greater impact for Nigeria however, given that each country obtains a different configuration of countries from the pool of control countries—we observe a smaller impact. We find that given the countries forming synthetic Nigeria we obtain marginal increases in exports above the synthetic country. In both non-oil and total exports we find that exports tend to overlap during the period. To provide a more precise estimate of the impact we note that in terms of total exports the short- and long-term impacts are 7.97% and 1.71% respectively. The short run impact is almost six times that of the long-run impact. The impact for non-oil exports is negative—the short- and long-run estimates are -38.2% and -10.6% respectively—indicating that on average synthetic Nigeria has higher exports of non-oil products compared to Nigeria. Readers must bear in mind that, in spite of Nigeria's export status among the AGOA countries, the internal conflicts and militancy related to oil production in the Niger Delta region has probably affected their oil exports[20].

The final country in figure (4.5) is South Africa. The plots for non-oil and total exports reveal a negative impact of the AGOA preference for South Africa. This probably goes against our *a priori*

[20]The political science literature offers some useful insights into the politics of crude oil and its effects on Nigeria. The key problem region is the Niger Delta, where oil vessels and foreign oil workers are sometimes hijacked and oil lines are cut. Douglas et al. (2004); Watts et al. (2004) and related papers at `http://oldweb.geog.berkeley.edu/ProjectsResources/ND%20Website/NigerDelta/pubs.html` focus on the Niger Delta region and the conflict arising due to access to oil resources. In terms of the economic literature these conflicts arising from having oil has been referred to as the "natural resource curse". Finding new deposits of oil has also been linked with the "Dutch disease"—whereby as a result of exploiting the oil resource the remaining sectors of the economy contracts. Frankel (2010) provides a useful survey of these issues while Metcalf and Wolfram (2010) studies the link between political institutions and erratic oil production. Sala-i-Martin and Subramanian (2013) provide a case study of Nigeria related to the resource curse and "Dutch Disease". Could this be a possible explanation for the poor export performance when oil products are excluded? Well this could be one reason especially for Congo (Rep.), Gabon and Nigeria. However, Angola in the results above does not show a significant downturn in non-oil exports—we rather observe a much larger short-term impact for non-oil exports compared to total exports but the long-term case sees a reversal of this. We do not explore these issues here in this thesis, we do note that, these are interesting areas of research that can be explored in the future.

expectations of the result. We note that a reason for this result might be the minimal overlap we observe in the pre-AGOA period between South Africa and its synthetic counterpart. However, the pre-AGOA predictor balances in the appendix (tables C.24–C.25) does show quite similar predictor averages indicating that the South African predictors match its synthetic counterpart. Furthermore the root mean square prediction error is low and is 0.4 and 0.6 for total and non-oil exports. The additional evidence in the appendix implies that the estimation went well. On the contrary the graphs tell us a different story. Another reason for the lack of overlap could be the end of apartheid which was a significant event in South African history and had implications in terms of its trade with the rest of the world. The various events culminating in the acceptance of South Africa and the removal of sanctions has probably affected our estimation in this case. Of note, is that the USA was one of the countries that had an embargo on South African exports at the time. We make this point since the trends in both countries points to some event occurring close to 1990 and creating a drop in South African exports—the exports then maintain their new trajectory for most of the remaining period. In table (4.17) the values for non-oil exports are -48.2% and -42.5% for the short- and long-run respectively. For total exports we find the values to be lower in magnitude— (-)22.3% and -30.5% for short- and long-run impacts respectively.

In the analysis above, we focused on the top five AGOA countries based on total exports. Of these countries South Africa and Nigeria are also among the top five AGOA countries based on non-oil exports. We decided to show the results for the three remaining countries based on non-oil exports—these countries include Kenya, Ghana and Mauritius. For all three countries we find considerable overlap in the pre-AGOA trends. The AGOA preference was provided to these countries on October 2000. Kenya shows a negative impact of AGOA on total exports for the entire post-AGOA period. In terms of total exports the initial negative impact is overturned returning the export series of Kenya above its synthetic counterpart. Table (4.17) shows that for non-oil exports of Kenya, the mean gap over the entire post-AGOA period is 28.3%. Thus, Kenya had 28.3% higher exports on average compared to synthetic Kenya. A closer look at the underlying data for non-oil and total exports shows no difference between the two categories (except for the usual rounding off errors however, all data has been kept in double precision to reduce this effect) for Kenya. Also, the synthetic countries are the same across the two categories and have the same weights. We however, note the presence of Bahrain, Iran and Jordan who contribute 4%, 7.1% and 23.9% to the synthetic Kenya country. These countries export oil and we believe that the difference across panels (a) and (b) might be explained by the oil exports included in the synthetic Kenya series. The exclusion of oil shows that Kenya obtains a long-term increase in non-oil exports above synthetic Kenya.

Mauritius in panels (c) and (d) show similar trends in exports. In both panels the impact is negative for a while after AGOA before Mauritian exports rise above its synthetic counterpart around 2010. The impact is estimated to be -39.7% and -13.5% for short- and long-run non-oil exports respectively. We observe lower magnitudes for total exports of -18.5% and -8.3% for the short- and long-run respectively. The higher exports towards the end of our sample period has resulted in the lower mean impact relative to the initial impact. Thus, even though Mauritius shows a negative impact, if it maintains the current trends in exports the long-term impact can turn positive to provide a positive long-term impact of the AGOA preference.

The final country in the figure is Ghana. The pre-AGOA trends show some overlap although we observe a wide swing in exports between 1980 and 1983. This can be explained by the economic downturn Ghana experienced in the late 1970s that reached its nadir in the early 1980s. In 1983, the Ghanaian economy adopted a package of reforms—"Structural Adjustment Programme (SAP)" of the Bretton Woods institutions. These two activities can be seen in the sharp decline—due to the downturn and the sharp increase—due to the package of reforms to stimulate economic growth—returning exports back to its initial growth trajectory[21]. This event occurred almost two decades prior to the provision of AGOA and we do not expect it to create significant estimation problems for us. In spite of this, we observe a marginal increase in exports of Ghana above synthetic Ghana in total exports. However, non-oil exports show that Ghana had lower exports over the entire post-AGOA period compared to synthetic Ghana. These translate into the -26.5% and -49.4% short- and long-run impacts of non-oil exports—while total exports show 20.3% and -22.6% gaps in table (4.17). It must be noted that Ghana's recent oil find should provide Ghana with some extra push to raise its exports as well as increase their benefits from oil exports. The current evidence shows that oil exporters benefit most from AGOA and with the recent oil discovery, Ghana is not the exception to the rule.

Having discussed the top five AGOA countries we now turn our attention to the bottom five countries in the next section and conclude the synthetic control approach presented here by summarising the placebo treatments carried out below.

Bottom five AGOA exporters

The inadequate data (for the predictors, especially GDP) for the entire period and lack of convergence in our estimator leads us to exclude Sao Tome & Principe, Djibouti, and Benin from the analysis below. We however, had no problems with data and convergence of the estimator for Burkina Faso, Gambia and Burundi that are among the bottom five AGOA exporters. We include Sierra Leone which is one of the countries ranked in the middle of the distribution of AGOA exporters. Doing this provides a perspective of one of the countries not found in either the top or bottom five AGOA exporters. We do provide evidence for some of the remaining AGOA exporters in the appendix for the interested reader.

All four cases, show a negative impact of the AGOA preference. Sierra Leone which is outside the bottom five countries does have extended periods of time where their exports match their synthetic counterparts. In terms of non-oil exports the short- and long-run gaps for Sierra Leone are -66.1% and -44.8% respectively. The initial impact is higher in magnitude than the long-term impact. In terms of total exports we find lower magnitudes of the impact. The short-term impact falls to -58.6% while the long-term impact is now -38.1%. A comparison of the impact here with those of the top five shows that the magnitude of the impact (in the case where exports are lower than the synthetic country) is larger.

As can be observed in the figure all the bottom five countries shown received their preferences much later than the original date of 2000 for the majority of the AGOA countries. The three bottom five countries, Burkina Faso, Burundi and Gambia do have their total and non-oil exports below their synthetic counterparts throughout the post-AGOA period. The gaps shown are relatively large

[21]See for example Ewusi (1987); Gyimah-Boadi (1990); Killick (2000); Loxley (1988) and related chapters in Aryeetey et al. (2000) on this issue.

and in table (4.17) are among the largest gaps recorded. The short-run impacts are -94.9%, -97.1% and -87.8% for Burkina Faso, Burundi and Gambia. The long-run impacts are -97.1%, -89% and -95.6% for the three countries. Similar gaps can be observed for total exports—(-)93%, -96.8% and -87.8% for Burkina Faso, Burundi and Gambia in the short-run. The long-run impacts are also -95.4%, -82.9% and -95.4% for the three countries. The three countries are least developed countries (LDC) based on the UN LDC criteria[22]. Their performance is therefore not surprising.

In summary, we find that the selected bottom five countries had a high negative impact of AGOA. Their shortfalls with respect to their synthetic counterparts is almost twice that of the least performing top five country. Furthermore, their impact is relatively worse than Sierra Leone (ranked in the middle). Despite providing a better performance than the bottom five countries, Sierra Leone's impact is larger in magnitude compared to the top five countries—although it is less than twice the worst performing top five country. We find that the ranking of the countries pretty much captures how well the countries have adjusted their exports to take advantage of the AGOA preference.

Placebo Tests

Following Abadie et al. (2010, 2012) and Abadie and Gardeazabal (2003) we conduct a series of placebo studies as a check on our results. Abadie et al. (2012) note that, the use of placebo studies can aid in evaluating the credibility of the synthetic control results. In our case, we use placebos where the provision of AGOA is reassigned to a different time period—1988. A second set of placebo studies reassigns the treatment to one of the countries in the control pool. We drop all treated countries and systematically reassign the treatment to each control country until we have covered all control countries in the pool. Each control country provided the treatment is then compared to the remaining control countries in the pool—and these countries are the ones selected to form its synthetic counterpart. We then plot the distribution of these plots and superimpose our initial synthetic results on the graph (these are the graphs that appear like a tangled web below).

Abadie et al.'s (2010) discussion of the placebo studies suggests that if the placebos have export gaps similar to the original synthetic analysis, then the analysis does not provide adequate evidence of the impact of the AGOA preference. When the gaps in the placebo studies are smaller in magnitude to the synthetic control studies then we can conclude that, the impact of AGOA for those cases are significant evidence of the impact—the interpretation here relates to figures (4.11)–(4.13). A similar interpretation in terms of our placebos designed based on changing the year AGOA was provided holds (see figures 4.8–4.10). A large placebo estimate in this case lowers our confidence that the estimated impact shown in figures (4.5)–(4.7) actually provides the impact of AGOA. The estimation in this case is done in each case with treatment reassigned to 1988. The same predictors are used in both sets of placebos. We now summarise the results of the placebo studies next.

In figure (4.8), Angola and Gabon exhibit gaps that are smaller than the gaps shown in figure (4.7). This implies that, the placebo treatment does not show an impact of AGOA larger than the earlier figure. The placebo estimate thus, raises our confidence about the impact shown in

[22]Angola and Sierra Leone are also classified as LDCs. However, Angola's oil resources has placed the country among the largest AGOA exporters.

the previous figure. Earlier we had been sceptical about the results for Nigeria and South Africa. Our placebo estimates for these two countries are similar to the estimates in the earlier graph. In particular, the South African trends are no different from the previous estimation, although Nigeria shows slightly different results between 1988 and 2003 for total exports. The Republic of Congo also shows similar trends and no larger impact for total exports. However, there is a difference in the placebo estimate compared to the previous graph for non-oil exports. The placebo estimates in this case do not show unusually large impacts compared to the previous graphs and this raises our confidence in the previous estimates. In a few cases such as South Africa, Nigeria and Congo it may be argued that a slightly different interpretation may result depending on the researcher assessing the graphs—mainly due to the subjective interpretation of the graphs. We do not expect this to be much of a problem given that these noticeable differences are not large enough to lead to us changing our confidence about the earlier estimates.

In the next figure (figure [4.9]), we find similar results as above. The gaps shown are not large enough to change our confidence about the earlier results. In particular, Kenyan non-oil exports show a negative impact—this should not be cause for worry. We would however, be cautious about the placebo estimate for total exports for Mauritius. Finally figure (4.10) also shows relatively smaller magnitudes of the impact in 1988. Burkina Faso and Sierra Leone show no evident differences in 1988 while Gambia and Burundi show differences that are smaller in magnitude compared to the previous estimates in figure (4.7). We are therefore satisfied that in the majority of cases our placebo treatment does not nullify our earlier SCM results. Although, we would be cautious about total exports for Mauritius—given the magnitude of the gaps as well as the deviation from zero observed for Mauritius. South Africa is the other case where caution in interpreting the impact is required. As explained earlier, the end of apartheid in the 1990–1993 period has reduced the predictive power of our SCM in this case—the pre-AGOA series no longer overlap after the event and remain apart for the rest of the sample period. This is unlike the Ghana case where the series returns to its initial trend and the synthetic Ghana and Ghana series overlap once more. Moreover, the earlier period of the shock in Ghana's case occurs much earlier in the series compared to South Africa. We are therefore not worried about reducing the predictive power of the SCM in the case of Ghana.

Our final set of graphs showing the distribution of placebo country gaps is presented in figures (4.11)–(4.13). In this case we do not plot the trend in exports but the difference in exports between the treated country and its synthetic country—that is, the export gaps. Angola and Congo show a positive gap for total exports larger than the remaining placebo countries. This raises our confidence about the synthetic results presented above. In terms of non-oil exports these two countries lie within the distribution of placebo gaps. The remaining countries, that is, Gabon, Nigeria and South Africa also have their export gaps lying within the placebo distribution of export gaps. Although, these graphs show us that the placebo gaps are larger than the resulting synthetic estimates for Nigeria, Congo and South Africa. We note that, there is the possibility that economic conditions and other events in the placebo countries could lead to such magnitude of gaps in the figure. The larger magnitude of the placebo gaps compared to the treated country gaps is a cause for concern. It may imply that our earlier synthetic results are not well determined and may have a low predictive power. However, we note that, the gaps of the treated countries are quite small and that even though the placebo countries display relatively larger gaps in magnitude—this may not be a serious issue. The gaps for the treated countries were smaller in magnitude and almost close to zero indicating that any impact observed was small in magnitude. In such a case, we believe this magnitude of the gap might be realistic. Compared to the case of Angola and Congo where we observe relatively large gaps. If we had observed placebo gaps twice the magnitude of the estimated gaps—this would have led to the conclusion that the estimated exports gaps showing the AGOA impact were not significant.

In figure (4.12) we carry out a similar exercise. The results are qualitatively similar to those above. We find that in all three countries (Ghana, Kenya and Mauritius) the treated export gaps lie within the distribution of placebo export gaps. In a few cases this distinction is marginal—for instance, panels (a) (d) and (f) have segments where the treated export gap lies almost on the outermost placebo export gap. Again, this should lead to concerns about the impact. However, as suggested above the difference in magnitude in a number of cases are within reasonable limits allowing us to have some faith in our earlier synthetic control results.

The final figure (figure (4.13) provides the results for the remaining treated countries—that is, Burkina Faso, Burundi, Gambia and Sierra Leone. With the exception of Sierra Leone the remaining countries have export gaps larger in magnitude than the placebo countries. Although Sierra Leone has parts lying within the distribution of placebo plots, we find that in the early years after AGOA, the magnitude in the gaps seem to be smaller.

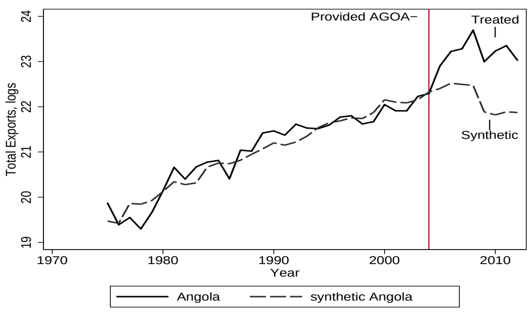
In interpreting the results of the placebos and the synthetic control estimates above we note that if there is a poor fit in the years prior to the intervention then the post-intervention gap could be a result of a poor fit and not as a result of AGOA (see, Abadie et al., 2010). There are a few cases where the pre-intervention gaps are off the zero horizontal line shown in the figures. Some of these cases include, Burkina Faso, Burundi and Gambia. The placebo studies are indicating that it is likely that the intervention we observe is due to a poor fit of our data rather than the AGOA impact. This is one likely interpretation of the results for these countries. Another issue of note is that, we need to ignore placebo export gaps that are not close to zero in the pre-intervention period. Thus, in all the panels shown for our three figures, a visual inspection shows that excluding those countries with a poor pre-AGOA fit does get rid of placebo gaps with large post-AGOA gaps.

In the placebo exercises, one way we tried to exclude countries with a poor pre-AGOA fit was by dropping all countries that had a root mean square prediction error (RMSPE) value twice as large as the treated country RMSPE. Doing this leads to varying numbers of countries being dropped from the figures shown. As many as 26 countries were excluded in panel (g) of figure (4.11). For the countries in figures (4.12)–(4.13) fewer placebo countries were dropped—in some cases just one country. In the appendix we show the cases where all 38 control placebo countries are included in the diagram. Even though we perform this exercise to exclude poor fitting placebo countries we are unable to exclude most of them. To do that we would need to exclude countries that have marginally higher RMSPEs and this would result in almost all the placebo countries being excluded from the diagram. Despite our convictions about the poor fit of the three countries, the remaining countries do show a much better fit even though there is no perfect overlap with the zero horizontal line in the figures for the treated countries. The improvement in the fit of these countries suggests that the observed impact of the preference is not the result of a poor fit of our model.

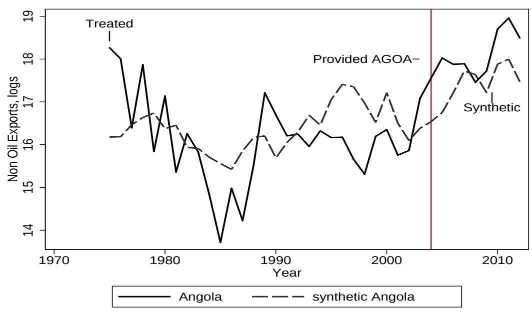
Table 4.17: Gap between treated and synthetic country: a year after AGOA and the mean over the AGOA period

Country	One year after AGOA	Mean Post-AGOA
Non-oil exports		
Angola	257.18	110.77
Burkina Faso	-94.87	-97.14
Burundi	-97.12	-89.03
Congo, Rep.	-43.41	-49.16
Gabon	-48.04	-7.17
Gambia, The	-87.82	-95.63
Ghana	-26.51	-49.41
Kenya	-12.34	28.3
Mauritius	-39.71	-13.53
Nigeria	-38.2	-10.63
Sierra Leone	-66.12	-44.78
South Africa	-48.19	-42.45
Total (including oil) exports		
Angola	64.76	198.65
Burkina Faso	-93.06	-95.4
Burundi	-96.77	-82.87
Congo, Rep.	-41.2	534.66
Gabon	-4.27	-2.41
Gambia, The	-87.81	-95.35
Ghana	20.3	-22.6
Kenya	-49.39	-43.3
Mauritius	-18.45	-8.29
Nigeria	7.97	1.71
Sierra Leone	-58.63	-38.1
South Africa	-22.25	-30.53

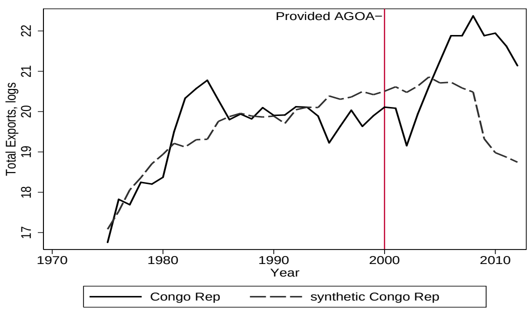
The growth rates in the table are calculated as the exponential of the log difference (between the treated and synthetic country) minus 1 (for example, in Angola's case, this is: exp[Angola exports (in logs) - Synthetic Angola exports (in logs)]-1)—since the export values are in logs this transformation approximates growth rate—the rate at which the treated country is higher or below the synthetic country. The rates calculated are then averaged over the entire post-AGOA period for each country taking into account when they received their preferential status (see the last column). The short-term values in the second column is the year immediately after they received their AGOA status—this is not an average but considers values for that particular year. Angola (December 2003, 2004 used in the analysis), Sierra Leone (October 2002), Gambia (December 2002, 2003 used in analysis), Burkina Faso (December 2004, 2005 used in analysis) and Burundi (January 2006). All remaining countries received their AGOA status on October 2000.



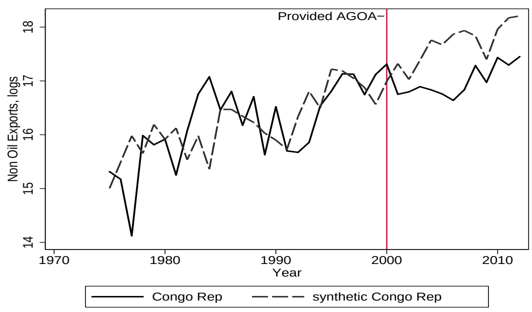
(a) Total: Angola



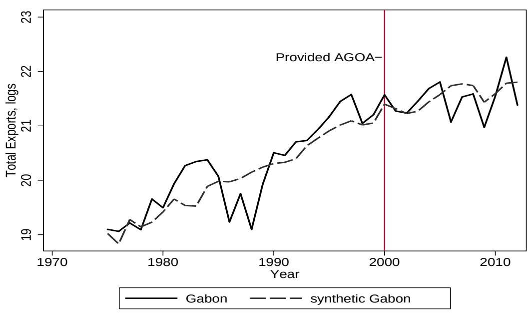
(b) Non-Oil: Angola



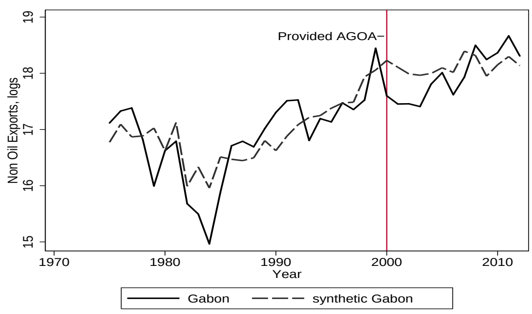
(c) Total: Congo, Rep



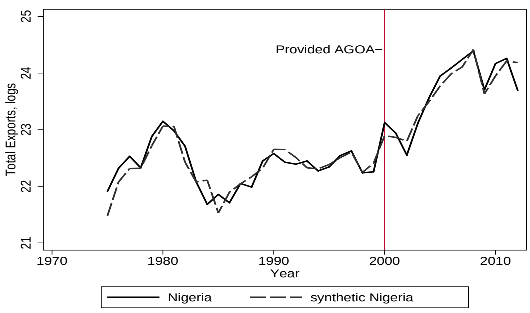
(d) Non-Oil: Congo, Rep



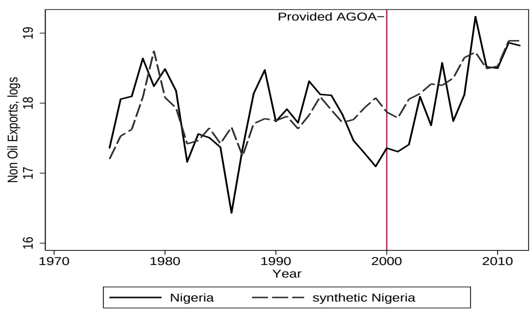
(e) Total: Gabon



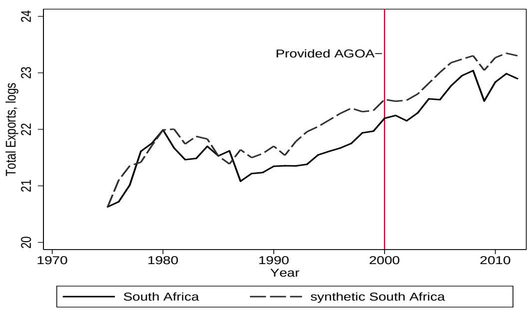
(f) Non-Oil: Gabon



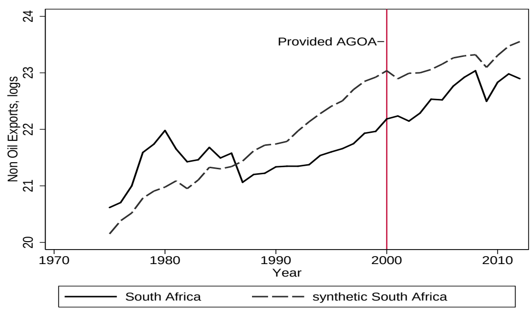
(g) Total: Nigeria



(h) Non-Oil: Nigeria



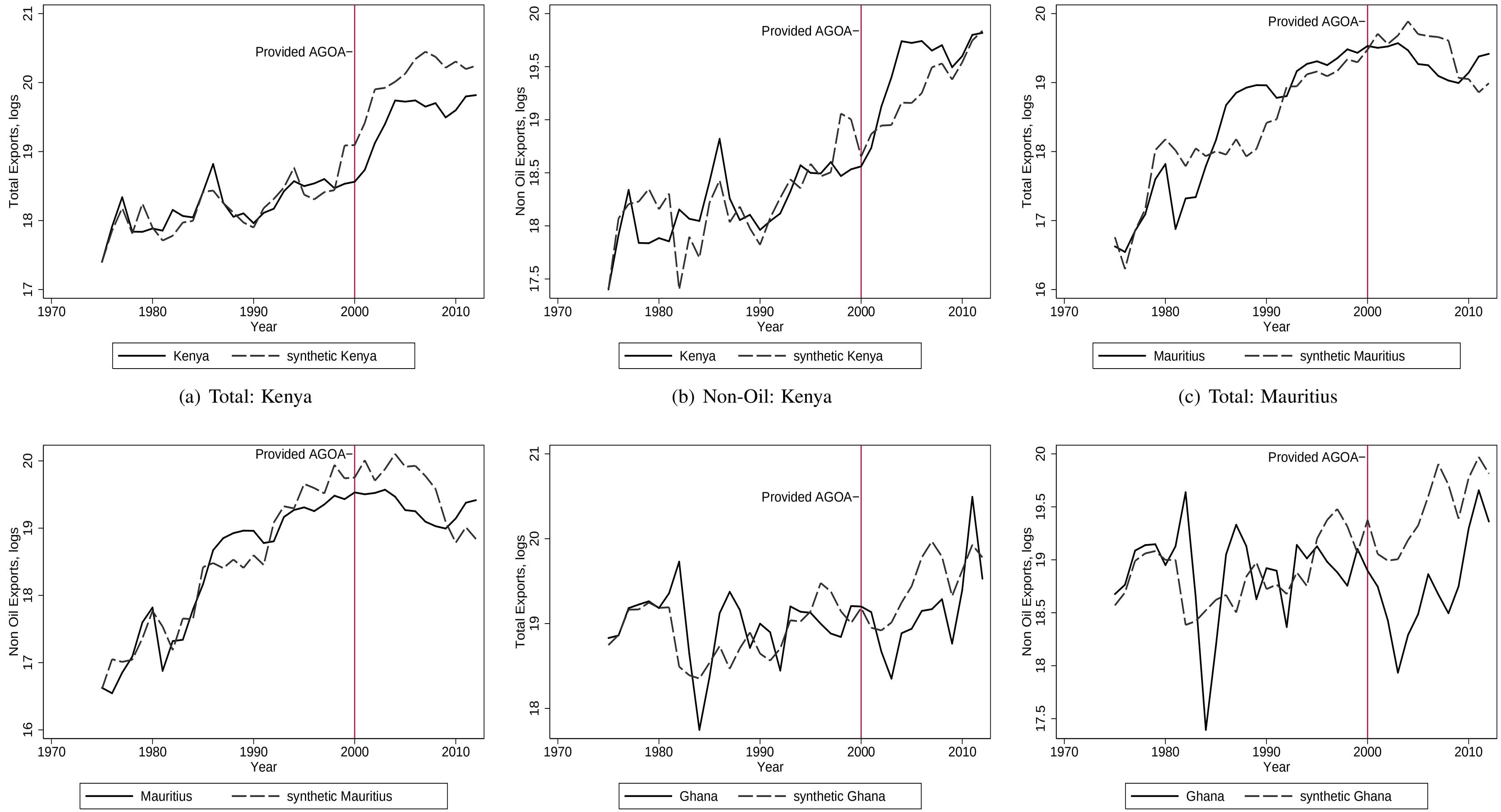
(i) Total: South Africa



(j) Non-Oil: South Africa

The top five countries shown above are based on mean exports of total exports (including oil) for the period 2000 – 2012

Figure 4.5: *Trends in exports: treated versus synthetic, for top five exporters (based on total exports)*



(a) Total: Kenya

(b) Non-Oil: Kenya

(c) Total: Mauritius

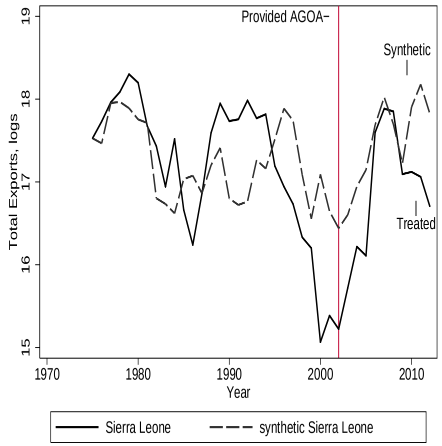
(d) Non-Oil: Mauritius

(e) Total: Ghana

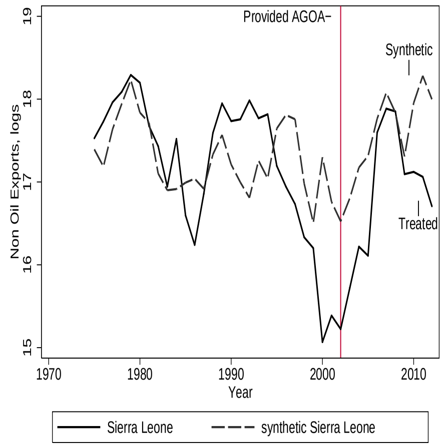
(f) Non-Oil: Ghana

The top five countries shown above are based on mean exports of total non-oil exports for the period 2000 – 2012. This set of countries include South Africa as the topmost exporter and Nigeria as the fifth ranked exporter. However, given that these two countries are in figure (4.5 they are not shown above.

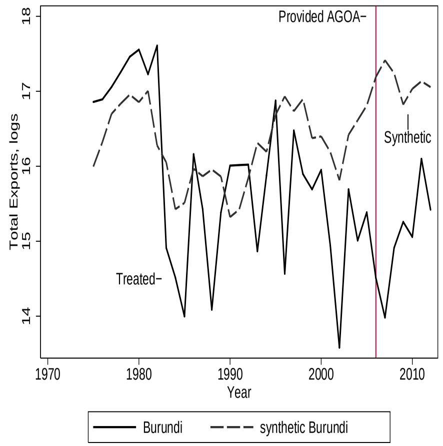
Figure 4.6: *Trends in exports: treated versus synthetic, top five exporters (based on total exports)*



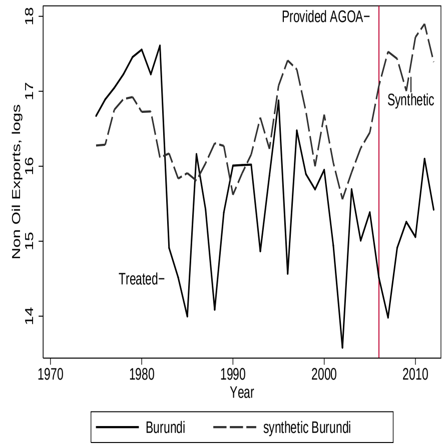
(a) Total: Sierra Leone



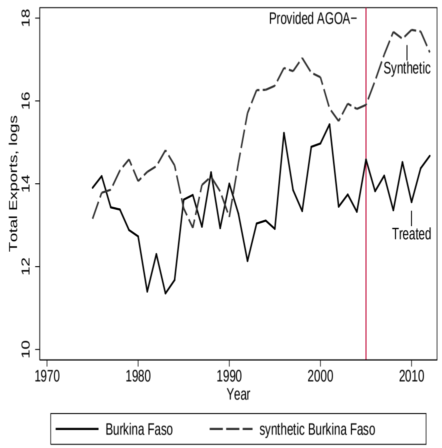
(b) Non-Oil: Sierra Leone



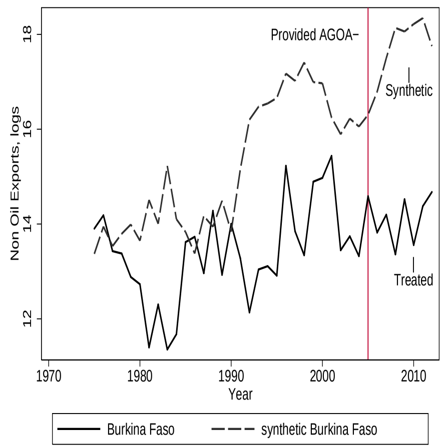
(c) Total: Burundi



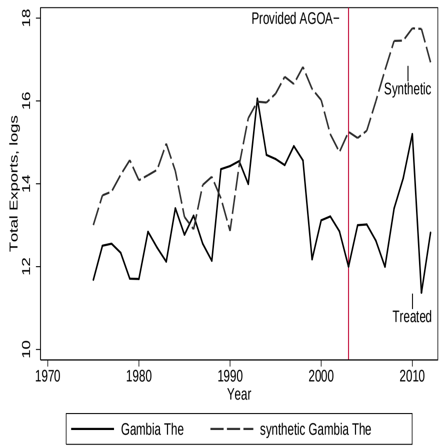
(d) Non-Oil: Burundi



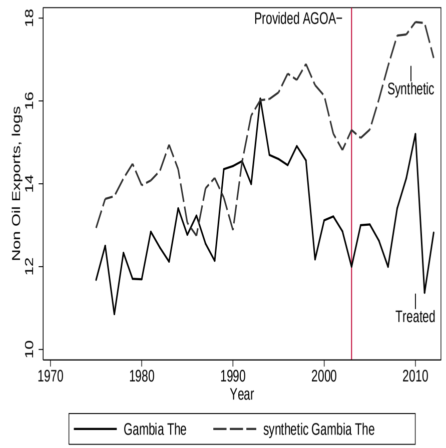
(e) Total: Burkina



(f) Non-Oil: Burkina



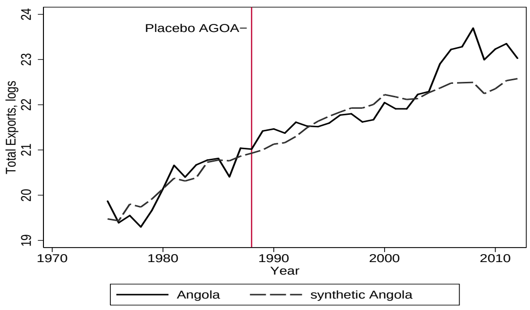
(g) Total: Gambia



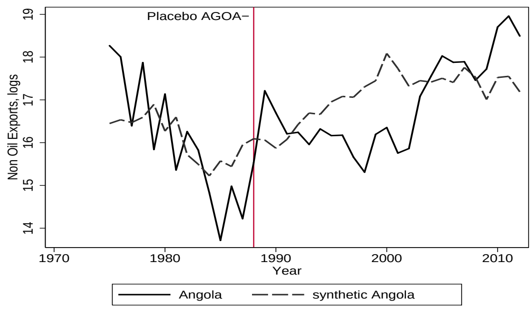
(h) Non-Oil: Gambia

Three of the bottom five countries are presented here. We could not obtain estimates for Sao Tome & Principe, Benin and Djibouti due to missing pre-programme exports and also missing values for GDP. Sierra Leone is added here even though it is not in the bottom five.

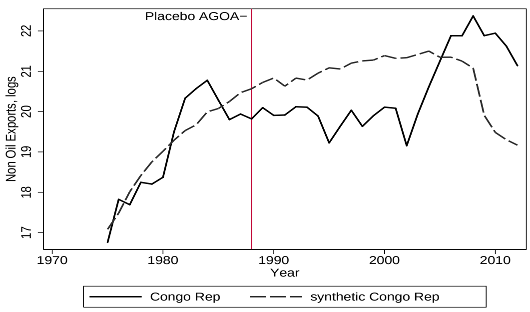
Figure 4.7: *Trends in exports: treated versus synthetic, for selected bottom five countries and Sierra Leone*



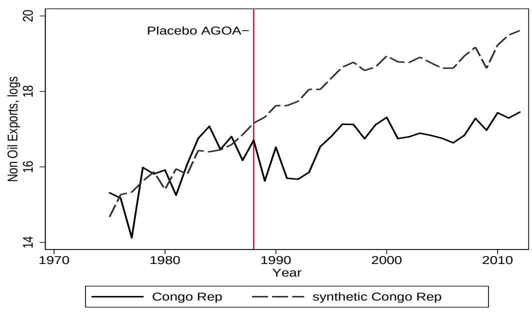
(a) Total: Angola



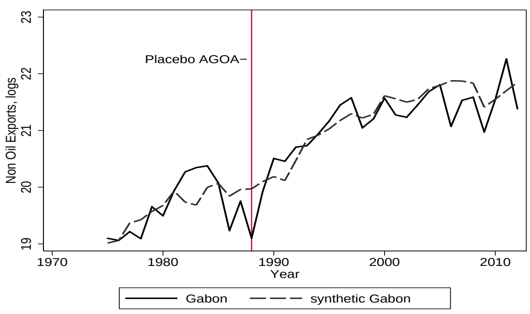
(b) Non-Oil: Angola



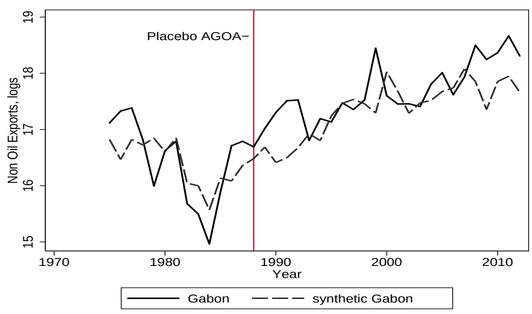
(c) Total: Congo, Rep



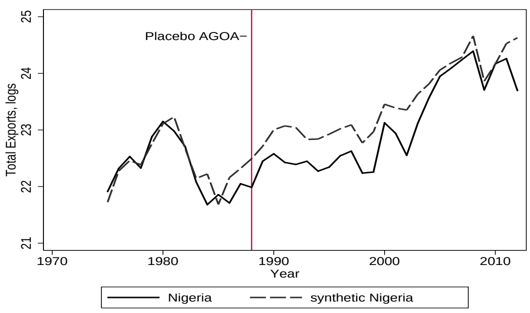
(d) Non-Oil: Congo, Rep



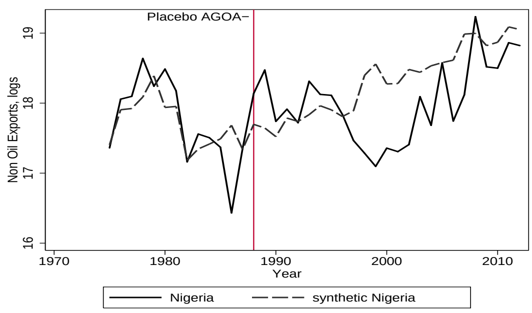
(e) Total: Gabon



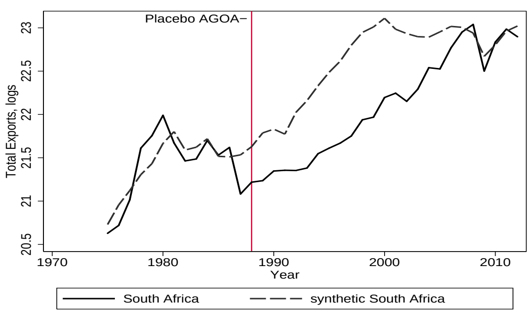
(f) Non-Oil: Gabon



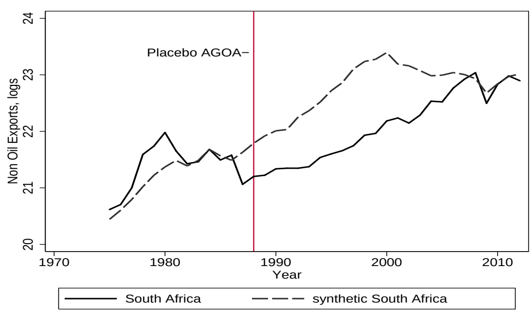
(g) Total: Nigeria



(h) Non-Oil: Nigeria



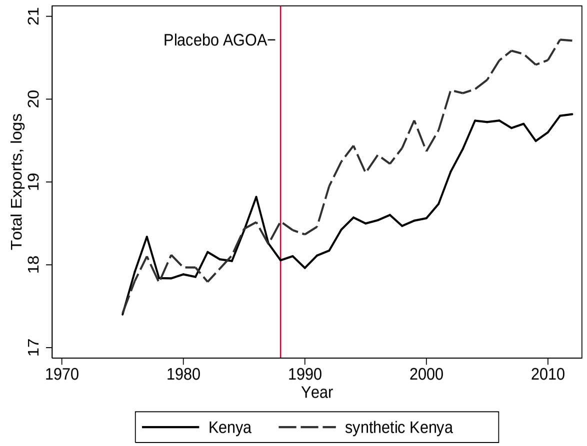
(i) Total: South Africa



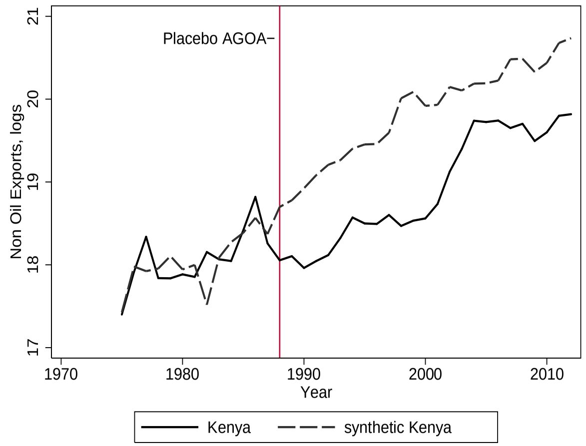
(j) Non-Oil: South Africa

The top five countries shown above are based on mean exports of total exports (including oil) for the period 2000 – 2012

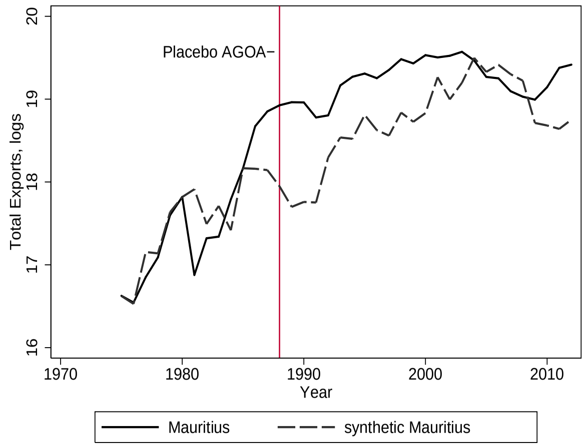
Figure 4.8: *Trends in exports: treated versus synthetic, 1988 placebo treatment*



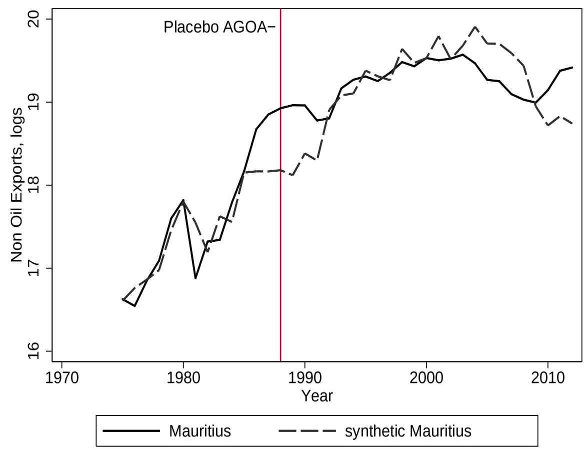
(a) Total: Kenya



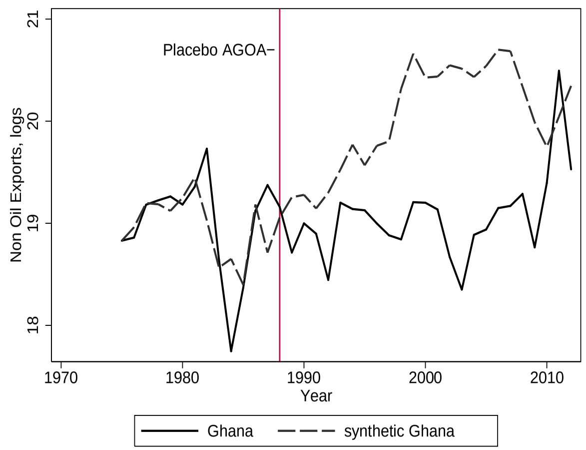
(b) Non-Oil: Kenya



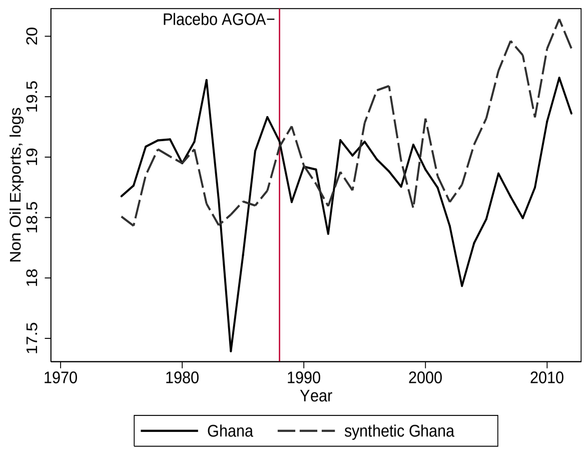
(c) Total: Mauritius



(d) Non-Oil: Mauritius



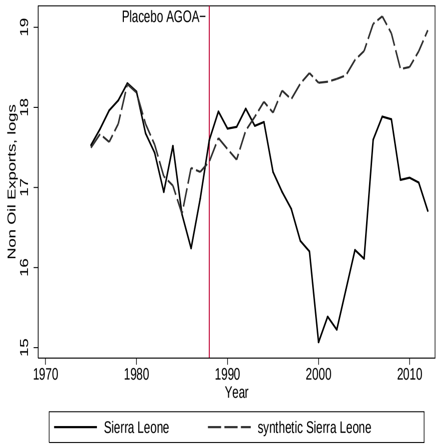
(e) Total: Ghana



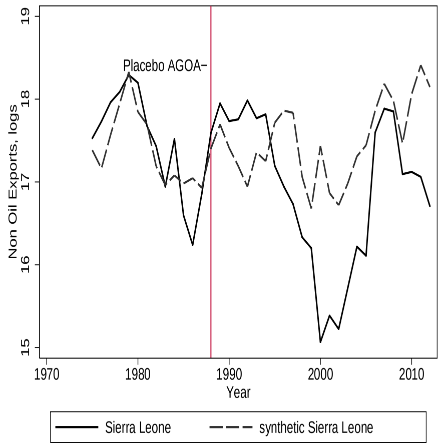
(f) Non-Oil: Ghana

The top five countries shown above are based on mean exports of total non-oil exports for the period 2000 – 2012. This set of countries include South Africa as the topmost exporter and Nigeria as the fifth ranked exporter. However, given that these two countries are in figure (4.8 they are not shown above.

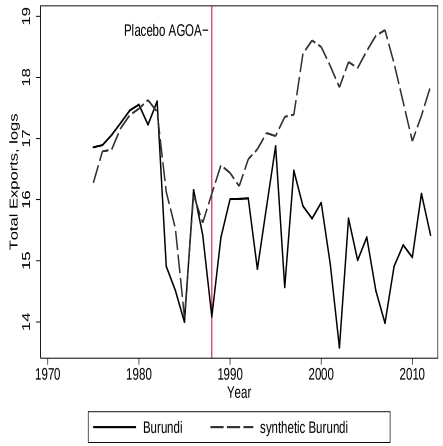
Figure 4.9: *Trends in exports: treated versus synthetic, 1988 placebo treatment*



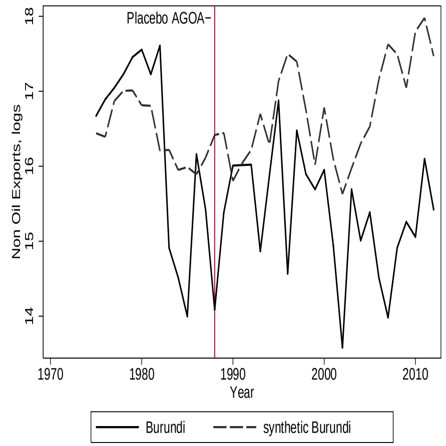
(a) Total: Sierra Leone



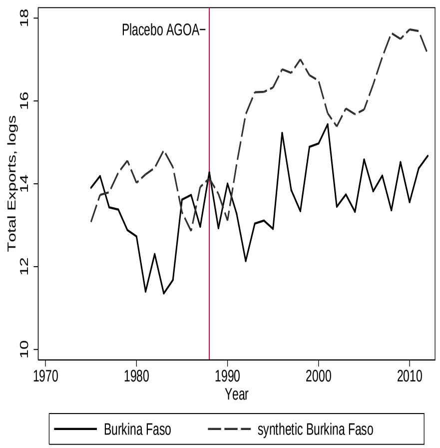
(b) Non-Oil: Sierra Leone



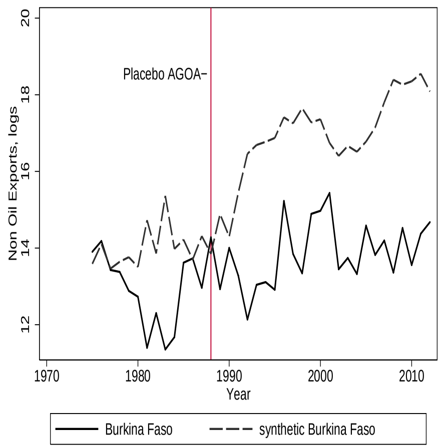
(c) Total: Burundi



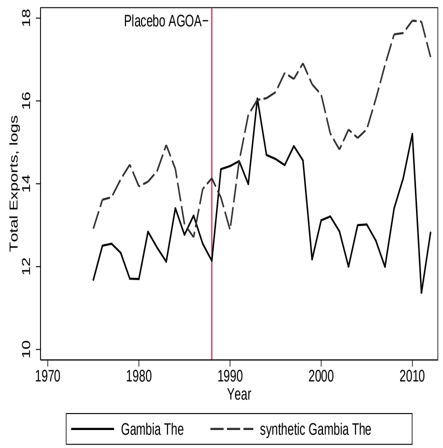
(d) Non-Oil: Burundi



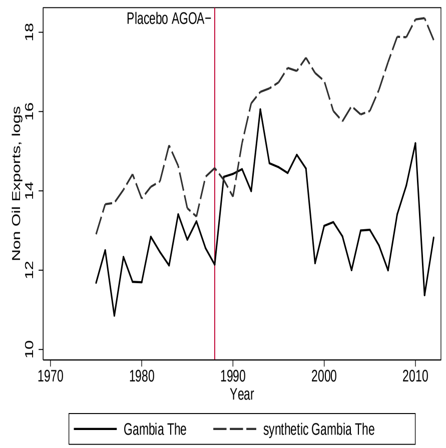
(e) Total: Burkina



(f) Non-Oil: Burkina



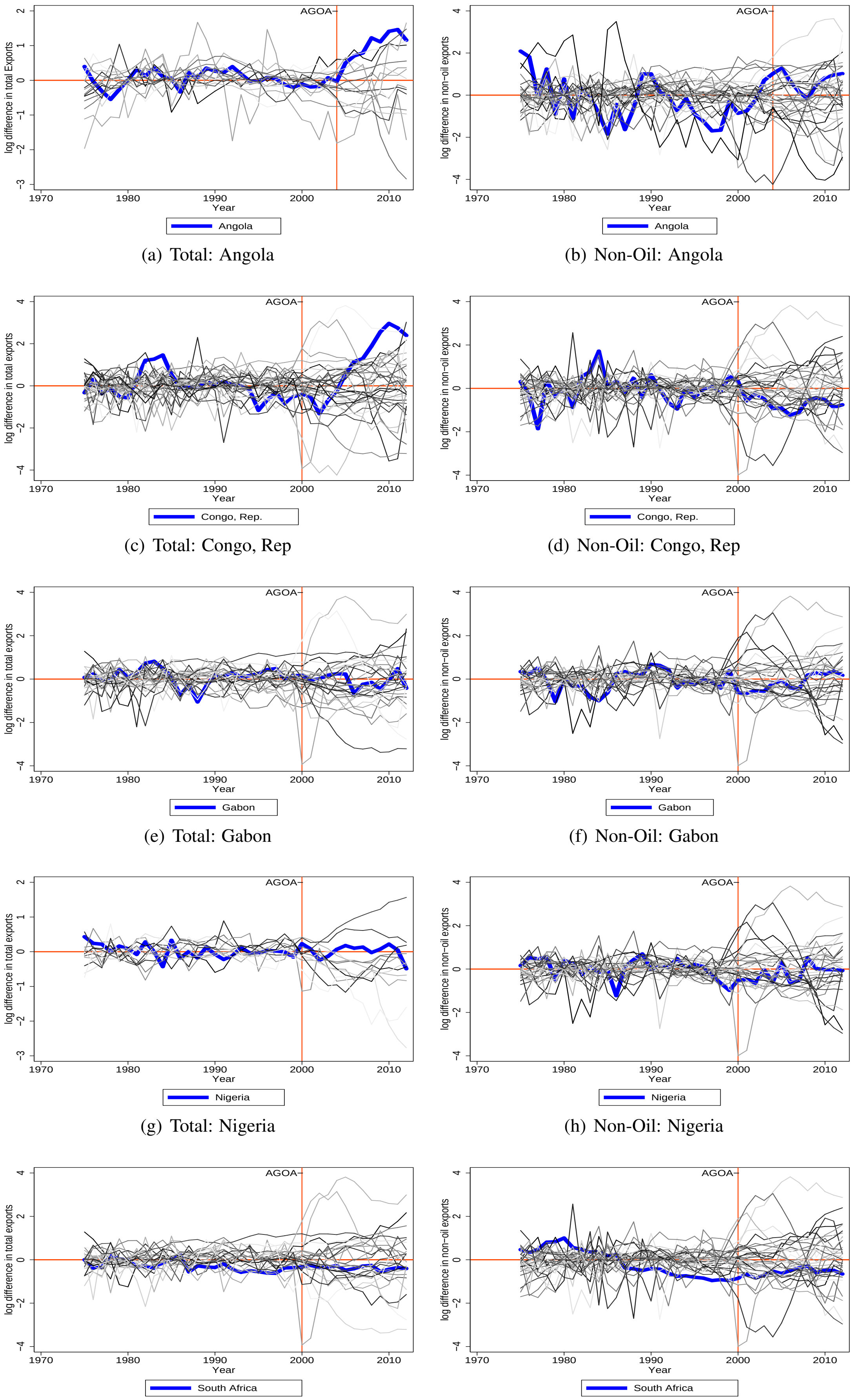
(g) Total: Gambia



(h) Non-Oil: Gambia

Three of the bottom five countries are presented here. We could not obtain estimates for Sao Tome & Principe, Benin and Djibouti due to missing pre-programme exports and also missing values for GDP. Sierra Leone is added here even though it is not in the bottom five.

Figure 4.10: *Trends in exports: treated versus synthetic, 1988 placebo treatment—for selected bottom five countries and Sierra Leone*



(a) Total: Angola (b) Non-Oil: Angola

(c) Total: Congo, Rep (d) Non-Oil: Congo, Rep

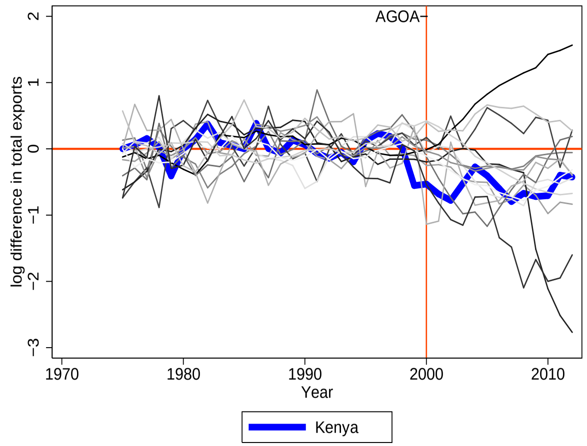
(e) Total: Gabon (f) Non-Oil: Gabon

(g) Total: Nigeria (h) Non-Oil: Nigeria

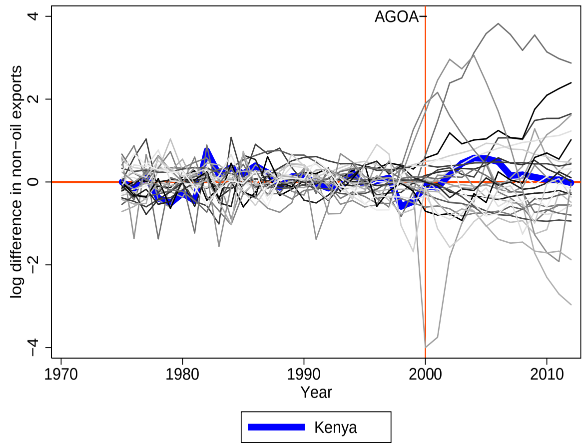
(i) Total: South Africa (j) Non-Oil: South Africa

Placebo countries are chosen based on RMSPEs less than twice the RMSPE of the treated country. RMSPE is the root mean squared prediction error. The thick blue line should be the outermost line plot for us to have confidence in the SCM estimate.

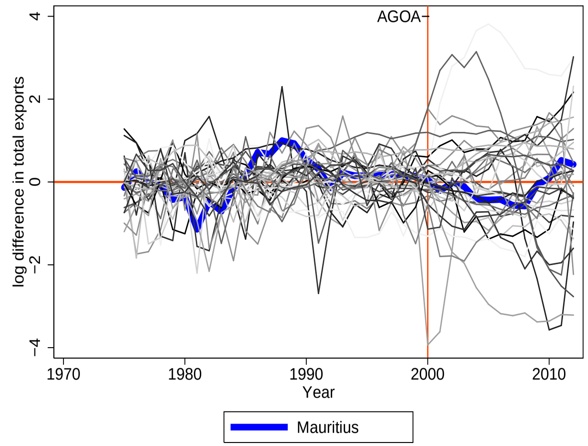
Figure 4.11: *Export gaps between treated and placebos countries*



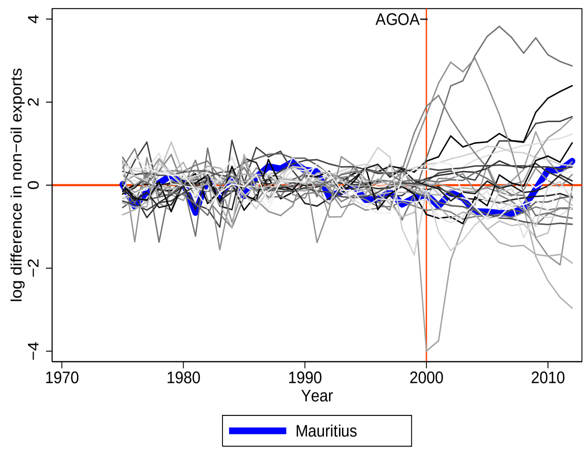
(a) Total: Kenya



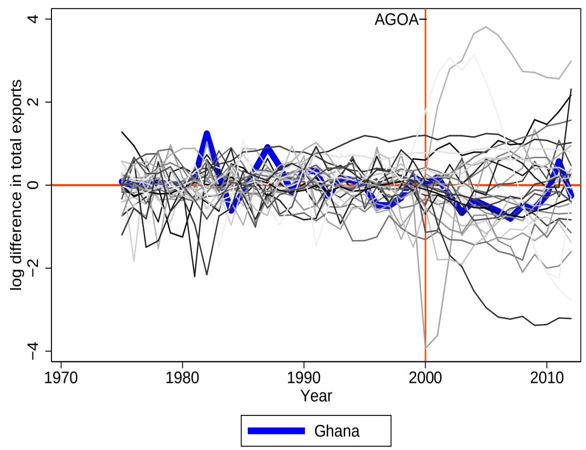
(b) Non-Oil: Kenya



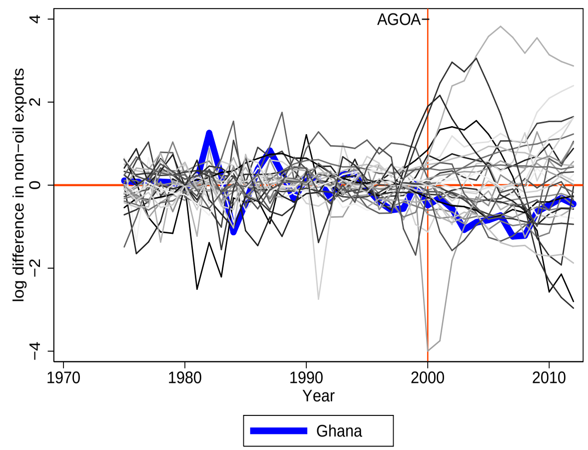
(c) Total: Mauritius



(d) Non-Oil: Mauritius



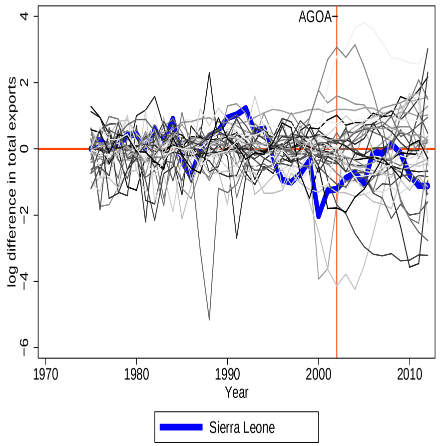
(e) Total: Ghana



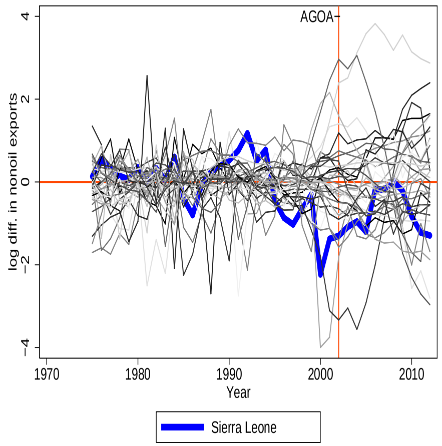
(f) Non-Oil: Ghana

Placebo countries are based on the RMSPEs being less than twice the RMSPE of the treated country. RMSPE is the root mean squared prediction error. The thick blue line should be the outermost line plot.

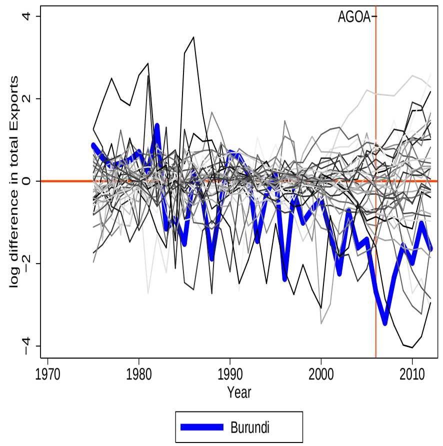
Figure 4.12: *Export gaps between treated and placebos countries with RMSE less than twice the RMSPE of treated countries*



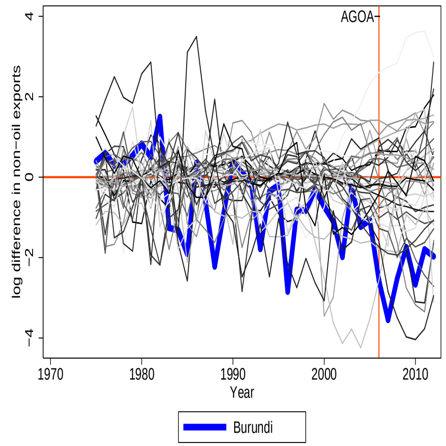
(a) Total: Sierra Leone



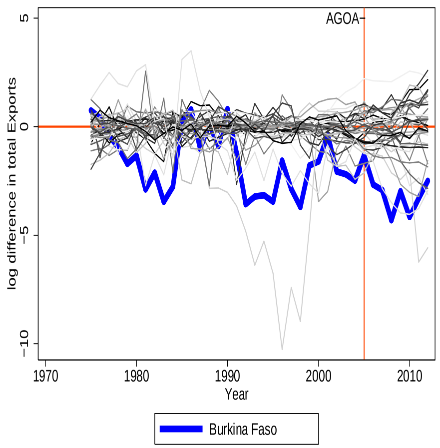
(b) Non-Oil: Sierra Leone



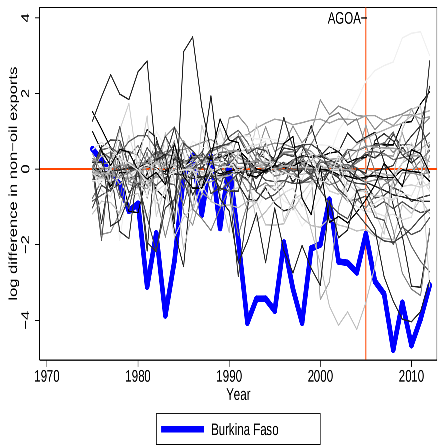
(c) Total: Burundi



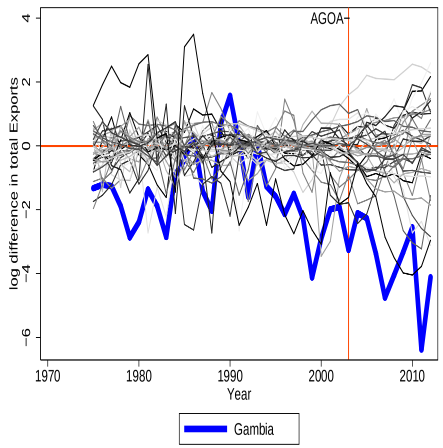
(d) Non-Oil: Burundi



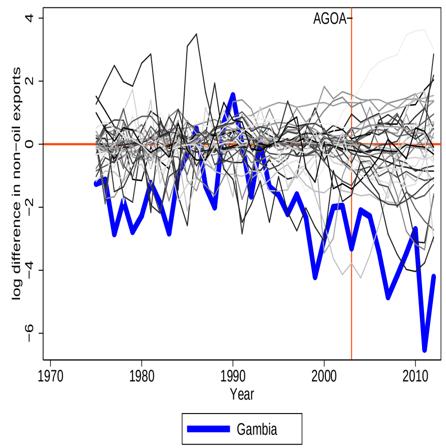
(e) Total: Burkina



(f) Non-Oil: Burkina



(g) Total: Gambia



(h) Non-Oil: Gambia

Three of the bottom five countries are presented here. We could not obtain estimates for Sao Tome & Principe, Benin and Djibouti due to missing pre-programme exports and also missing values for GDP. Sierra Leone is added here even though it is not in the bottom five. Placebo countries are based on the RMSPEs being less than twice the RMSPE of the treated country. RMSPE is the root mean squared prediction error. The thick blue line should be the outermost line plot for us to have confidence in the SCM estimate.

Figure 4.13: *Export gaps between treated and placebos countries with RMSE less than twice the RMSPE of treated countries*

4.4 General observations and Conclusion

The matching estimators of sections (4.3.1 & 4.3.2) have provided us with a counter-factual to measure the impact of AGOA on the exports of the beneficiary countries. The results of the matching analysis shows a negative impact of AGOA. Further analysis reveals that product clusters such as TALF, AMDS, OI and CPR are negative and significant in a number of tables. We would have expected a positive estimate for our TALF exports. Our explanation of the negative estimate is that, the product cluster includes products outside the apparel and textile cluster—these include leather and footwear exports. These additional products included in this cluster are not key exports of the AGOA countries and they contribute to the negative estimate observed in the table. For a summary of the tariffs based on the clusters and the key products see tables (C.17)–(C.19) in the appendix. The simple average MFN tariff for the TALF cluster is 8.5% with a maximum tariff at the tariff line level of 37.5%. The simple average MFN tariffs for apparel and textiles is 10.4% and 8.0% (with a maximum tariff at the tariff line of 28.6% and 20.8%) respectively. We believe the inclusion of leather and footwear products with higher average (and maximum) tariffs have reduced the exports for the TALF cluster. In terms of the AGOA preferential tariffs, apparel and textile products have more generous rules of origin and with key tariff line products having zero or very low tariffs. This is an added advantage for AGOA countries exporting under the special textile regime of AGOA. A similar observation can be made for the EI cluster—the simple average AGOA tariff is 1.3% but 0.3% for fuel products. The simple average MFN tariff is also 2.1% for the EI cluster and lower at 0.5% for fuel products.

For the remaining significant product clusters a similar observation can be made. AMDS, OI and CPR clusters again are not key sectors of the AGOA countries. Besides, the countries exporting these products are seen to export relatively low values compared to the control countries in the sample. This is then translated into the negative estimates observed. The extractive industry cluster includes other non-oil products such as salts, ores, ceramic products, stone, plaster, cement, glass, glassware, metals and precious stones which have crowded-out the effects of oil exports within the cluster. This crowding-out effect might be responsible for the non-significance of the cluster. We however, note that, this cluster remains positive even though it is statistically not significant. One product cluster, ISOM returned a positive estimate in table (4.11)—in this table, our treated countries are fewer and include only the consistent AGOA countries that have been provided with the EBA preference by the EU. This may be one reason we can attribute to the positive coefficient—in this case, given the composition of the treated countries we observe a lower crowding-out effect for this product cluster[23].

Returning to total exports to the USA on a few occasions we obtain a negative coefficient indicating that the impact of AGOA for our treated countries has been negative. In other words, AGOA has been unable to raise their exports compared to the counter-factual. This effect is present in a few tables. Again, the crowding-out effect is working at the country level to reduce the impact of AGOA. Similarly, the results for the difference-in-difference estimator yields a significant estimate for the difference in exports between 2002 and 1997 in almost all tables. The result signifies that, there has been a lower increase in exports over the period relative to the counter-factual. In spite of the signs of our estimates, we note that there is a good level of consistency in the estimates across

[23]Table (C.7) in the appendix provides the descriptions of the HS product list mentioned in this chapter and the next.

the various matching estimators and the exact matching estimates in the robustness section. The consistency across the various configurations of our algorithms and choice of covariates in the exact matching section increases our confidence in the ability of our estimates to provide the causal impact of AGOA. As in any economic analysis we are cautious in referring to our estimates as causal but intend to use them to show the direction and significance of the impact. Furthermore, they provide us with an initial estimate that can serve as a benchmark in future studies analysing the causal impact of AGOA.

Our caution about our matching estimates is due to minor pitfalls in the analysis. We acknowledge that the matching framework passed many of the tests of covariate balance and overlap of our treated and control countries. Other tests conducted also support the quality of the matches. However, we consider the definition of our treated countries to be part of the problem. For instance, our matching estimator is based on averaging post-AGOA outcomes over the 2001–2010 period and across countries. This averaging of the outcomes has yielded the crowding out effects we find in our estimator at the aggregate level. A similar problem is introduced at the product cluster level where our product clusters include sectors that are not key exports of the AGOA countries thereby watering down any strong impacts at the product level. We note that this is essentially not a serious problem for the analysis. In fact it is possible to try various configurations of our product categories to see whether the results would change. Our attempt at this is the exclusion of oil exports from total exports to the USA which is performed in the previous section. Excluding oil exports we find that the majority of AGOA countries do not show a positive impact of AGOA.

However, the inclusion of oil in exports shows up in a positive impact of AGOA for majority of the oil exporting AGOA countries. Another minor pitfall, is that, within the 2001–2010 period we have a number of countries such as Angola, Sierra Leone, Gambia, Burkina Faso and Togo who received their AGOA status between 2002 and 2008. We did not make this distinction explicitly in the calculation of the average post-AGOA outcomes. Our definition of the various sets of treated countries, was an attempt at making this distinction and incorporating the subtle differences in the year AGOA was granted. The results largely show very little differences across the treated groups and this leads us to believe that any errors introduced as a result has had a very limited effect on our estimates. In this manner given the above definitions, one could think of our estimates as *intention to treat* estimates rather than an *average treatment effect*. This way we can rationalise including the other periods in the analysis. Thus, what we have shown is that, **SSA countries that were initially pencilled down for the AGOA preference (including those that did not immediately take up the preference or satisfy the criteria to attain AGOA status) have exported less to the USA compared to the counter-factual countries**. In the evaluation literature this can be considered the impact of the preference given that AGOA is exogenous. Thus, the exports of the AGOA countries have not increased above that of the counter-factual countries as a result of the AGOA policy.

As a result of the pitfalls mentioned in the previous paragraph, we adopted a synthetic control method (SCM) to address any shortcomings of the matching exercise. The advantage of the SCM is that it allows us to observe the time series of exports compared to the counter-factual country. Moreover, the SCM is a comparative case study approach which allows us to compare each treated country to a counter-factual country that is constructed such that its exports before AGOA are similar if not the same as the treated country chosen. This provides a convenient way of observing how well the treated and counter-factual countries are similar prior to the provision of AGOA. We draw upon graphical tools to show the gap between the series of the treated and synthetic country at the time of the AGOA provision. The gap observed between the treated and synthetic country, then becomes the impact of the preference. One is able to observe the immediate and the long-term impact of the preference. In our SCM exercise on our selected top and bottom five countries we find that Angola, Nigeria and Congo show positive impacts of AGOA on their total exports. While Angola and Kenya are seen to have a positive impact on non-oil exports. All the remaining countries show negative impacts of the preference.

In conclusion, this chapter has provided empirical estimates of the impact of AGOA. Our results show that few exporters tend to benefit from the preference—these tend to be the oil exporting AGOA countries. Nonetheless, the top five largest exporters export more than 10 times the remaining countries. This large disparity among the AGOA countries leads us to pursue a quantile regression analysis in the next chapter to tease out the differences in the impact at the various percentiles of the distribution of exports to the USA.

Chapter 5

Is there a heterogeneous impact on exports to the USA?

5.1 Introduction

The current chapter attempts to fit within the body of literature discussed in chapter (2) by analysing the impact of AGOA on exports of recipient countries to the USA. We depart from the previous two empirical chapters, by defining a counter-factual set of countries for the preference recipients and applying a quantile regression analysis to the matched set of countries. This chapter is not based on obtaining matching estimates of the treatment effect, but an estimation of the treatment effect given a set of matched countries. We carry out the analysis by first, matching countries receiving the AGOA preferences to a set of countries having similar characteristics but are not AGOA beneficiaries[1]. Quantile regressions are then applied to the matched sample of countries. For comparison, the analysis is also performed using the non-matched sample.

The quantile framework allows us to study whether the impact of AGOA has had a heterogeneous impact on the recipients. In other words, when we consider the export distribution of the recipients and compare this distribution to that of the control countries, do we observe the impact at the tails of the distribution rather than having a considerable difference in the middle of the distribution. The quantile regression enables us resolve questions concerning the entire distribution of exports for our sample of countries. Matching the countries reduces the heterogeneity of the sample of countries although the sample remaining does not become fully homogeneous. Removing some of the heterogeneity and using the restricted sample, thus allows a cleaner estimate of the impact of the preference at the various quantiles. This might explain the large variation in the impact of AGOA that is reported within the literature.

The chapter seeks to answer the following questions, (a) have the exports of AGOA recipients to destinations other than the USA suffered as a result of the AGOA preference? (b) Are there any differences in the impact across the various percentiles (or quantiles) of the export distribution? (c)

[1] These characteristics include area of country, gross domestic product, population, whether landlocked, English or Spanish speaking, distance to the USA, religion, per capita gross domestic product, savings per gross national income, corruption, regulatory quality, voice & accountability, agricultural land area (% of total land area) and World Bank income classification (low/lower middle/upper middle income classification). Thus, based on the same set of covariates in chapter (4). See section (4.2.1) in chapter 4 for more details on the propensity score matching framework. The idea in this chapter, is to have similar countries in the regression. We therefore use the matched countries constructed based on the propensity score in chapter 4. In the appendix and in the robustness section below we no longer use the matched countries from chapter 4.

what factors explain the "raw" gap between exports of AGOA and non-AGOA recipients? and (d) is the quantile impact affected by the choice of countries used as the counter-factual? and (e) is the AGOA impact present only in apparel/textile and crude oil (and oil product) exporting countries.

The first of these questions is answered by considering the ratio of exports to the USA to exports to the EU and rest of the world (ROW) respectively. A positive estimate would imply an increase in exports relative to the other destination when compared to the control group of countries. The second question is answered by statistically testing whether there are any significant differences among the parameters estimated for each quantile. A quantile decomposition analysis would through further light on the gap between the exports of the treated and the control countries—thus providing an answer to the third question. The fourth question is answered by comparing the magnitude and significance of the quantile estimates across the two samples—that is, the matched sample and the larger sample having all countries in our dataset. The final question is based on estimating separate quantile regressions for each product group and checking which products have positive coefficient estimates. In addition, to answering the questions above, the chapter would provide additional robustness analysis to show whether excluding certain products (such as the extractive industry and agricultural products among others) affect the impact of AGOA on the treated countries.

The contribution of this chapter is therefore the adoption of a quantile analysis to show the heterogeneity in the impact of AGOA on exports of recipients compared to other non-recipient countries across the export distribution. Secondly, a decomposition of the impact is done to show the price and output effects of the preference. These two analyses are the main contributions and novel aspects of the current chapter. A final contribution is the notion that, having all countries included in the regression as comparator countries overstates the impact. On the other hand, using a subset of countries that are more similar to the AGOA recipients reduces the impact of AGOA on the exports of recipients to the various destinations.

The rest of the chapter is organised as follows Section 5.2, provides descriptive and graphical evidence provided by the data on both recipients and non-recipients. Section 5.3, presents the econometric approach adopted in this chapter. Section 5.4, discusses the results. Finally, Section 5.5 concludes.

5.2 Data and descriptive evidence

5.2.1 Data

Data is obtained from several sources. Data for the outcomes are obtained from the UN-Comtrade database and the United States International Trade Commission (USITC)[2]. The World Development Indicators and IMF's International Financial Statistics databases provide macroeconomic indicators (such as, gross domestic product, inflation, population, value-added (in industry, manufacturing, agriculture, construction, services, etc), interest rates, exchange rates among others) for the purposes of matching similar countries. Additionally, Kaufmann's Global Governance[3], Database of Political

[2]dataweb.usitc.gov/
[3]www.worldbank.org/wbi/governance/

Institutions[4], Polity IV and Bates et al (2005)[5] databases provide political, cultural and religious data to augment the vector of control variables needed to perform a realistic match. Finally, gravity type variables are obtained from the CEPII gravity database [6].

The cross-section dataset consists of 42 treated and 122 control countries. The number of control countries available in the panel of 10 (2001–2010) years reduces to 68 countries due to missing data on our covariates for the quantile regressions. The full set of control countries include developing countries in Asia, Central and South America, the Caribbean and North Africa. After matching, the number of control countries remaining declines to 34 countries—giving us a total of 76 countries for the matched sample. The full sample including matched countries is 164 and 106 countries for the cross-section and panel data analysis respectively. This set of countries is largely based on the countries for which a full set of data on all variables used in the analysis exists. Table (C.5) in appendix (C) shows the number of treated and control countries falling within each block of the propensity score as well as the overall number of treated and control countries matched.

To motivate the choice of the quantile regression discussed in section (5.3.1), we show the distribution of exports to the USA, EU and ROW. The kernel density estimates in figure (5.1) shows the differences in the distribution of exports for AGOA, non-AGOA and *Caribbean Basin Trade Protection (CBTPA)*[7] exporters. The CBTPA exporters are shown separately since they have similar tariff preferences as the AGOA recipients. Thus, in the analysis of the impact of AGOA on the treated countries, they are excluded from the control group of countries to allow the impact of the AGOA preference on the African countries to be identified at the estimated quantiles of interest. Figure (5.2) provides the quantile plots for the outcome variables for AGOA and non-AGOA countries. The diagonal solid line is a reference line indicating points of symmetry for a distribution. Given that, in all the graphs, the points of the outcome variable lie off the reference line, it can be concluded that the distributions are heavily skewed. The non-AGOA outcomes are skewed to the left. It is the non-symmetrical nature and skew present in the export data that motivates the quantile regression adopted in this chapter as the average impact is likely to be driven by the countries in the top quantile.

5.3 Econometric approach

5.3.1 Quantile regression framework

In applying our regression analysis, we use the quantile regression estimator of Koenker and Bassett (1978). The decision to incorporate the quantile framework is to capture any differences that might occur at the various percentiles[8] of the export distribution. Secondly, ordinary least squares (OLS) regression is sensitive to outliers and these can influence the results. The median regression on the

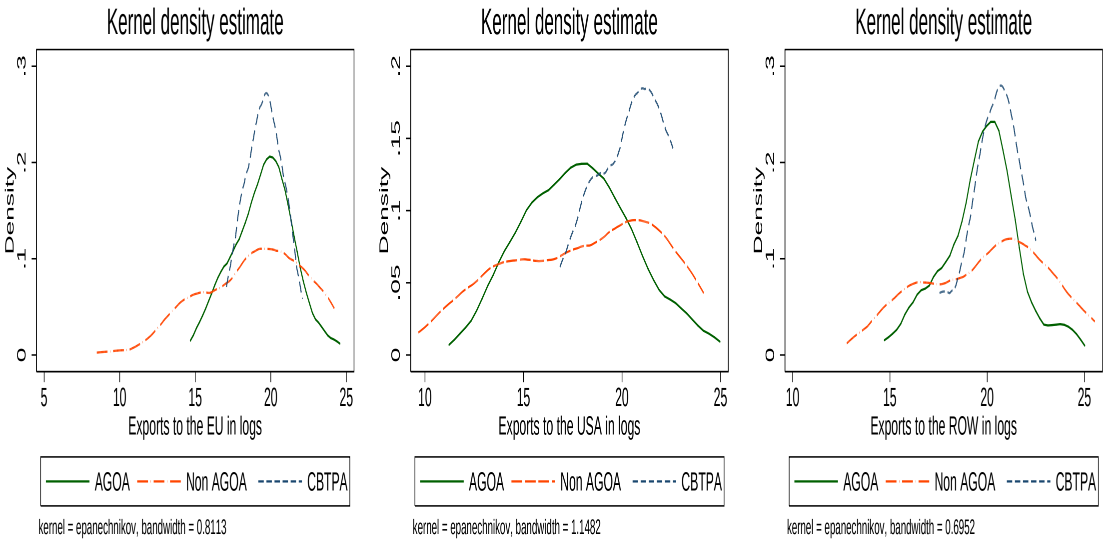
[4]Thorsten Beck, George Clarke, Alberto Groff, Philip Keefer, and Patrick Walsh, 2001. "New tools in comparative political economy: The Database of Political Institutions." 15:1, 165-176 (September), World Bank Economic Review.

[5]Robert Bates ; Karen Feree; James Habyarimana; Macartan Humphreys ; Smita Singh, "Other Political Data (updated 2005)", http://hdl.handle.net/1902.1/14977 UNF:5:XzsUmjt4AZzpm9JB3hO6pA== Murray Research Archive [Distributor] V1 [Version]

[6]http://www.cepii.fr/anglaisgraph/bdd/gravity.asp

[7]These are mainly countries in the Caribbean Basin region. We also exclude Central American countries, Dominican Republic and Mexico since they have a free trade agreement with the USA.

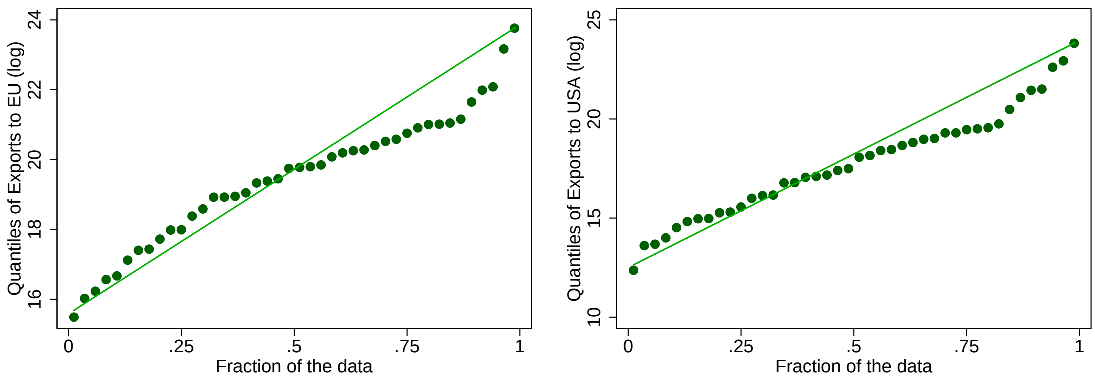
[8]we use quantiles and percentiles interchangeably in this chapter to refer to various points on the distribution of export values.



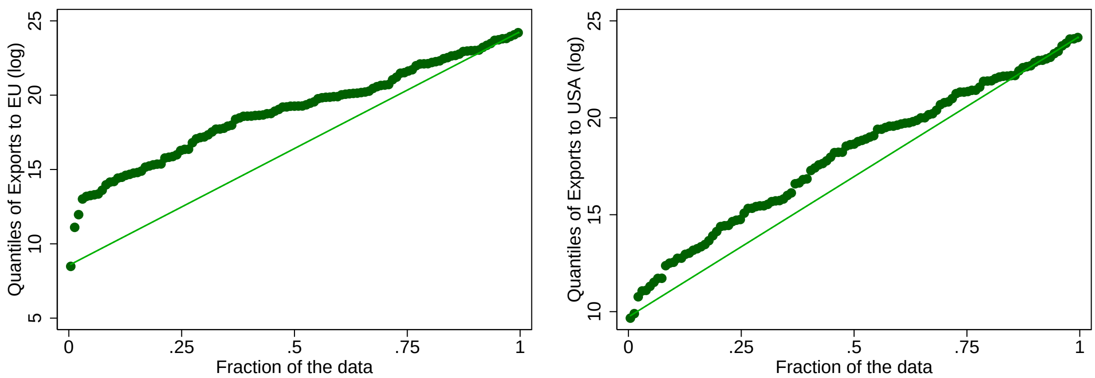
(a) Exports to the EU (b) Exports to the USA (c) Exports to ROW

Source: Author's elaboration based on the UN Comtrade database.

Figure 5.1: *Kernel Density estimates of exports, by preference*



(a) Exports to EU–AGOA (b) Exports to USA–AGOA



(c) Exports to EU–Non-AGOA (d) Exports to USA–Non-AGOA

Source: Author's elaboration based on the UN Comtrade database.

Figure 5.2: *Quantiles plots of exports: AGOA and Non-AGOA countries*

other hand is less sensitive to outliers (see for instance Cameron and Trivedi, 2005; Wooldridge, 2002). Thus, using the quantile regression is useful in the presence of outliers. For instance, Nigeria, Angola, South Africa, Congo (Rep) and Chad during the period 2001 – 2010 had exports above the mean level of exports in each year. Chad (in 2008), Congo (Rep) (2006–2010) and Gabon (2001–2005) have also had exports greater than the mean level of exports for the periods specified in brackets. To provide an idea of how large these are, we note that, Nigeria, Angola and South Africa were 3.32, 1.12 and 0.79 standard deviation units above the mean on average for the ten year period. More specifically, the values are 4.40, 1.47, 0.86, and 0.11 for Nigeria, Angola, South Africa and Congo (Rep) in 2010 respectively. All remaining countries for that year were 0.06–0.41 standard deviation units below the mean. This seems to be the pattern in all years with two exceptions. In 2001–2005, Gabon was the fourth highest overall exporter with their exports above the mean level of exports. They are replaced by Congo (Rep) from 2006 as the fourth highest AGOA exporter. Secondly, in 2008, Chad becomes the fifth highest exporter with exports larger than the mean level of exports of all AGOA beneficiaries. In these two cases, the standard deviation units are positive but less than one. Nigeria and Angola in particular are outliers and thus in a mean regression (OLS) they might influence the estimated impact. This requires us to use methods that are less sensitive to influencing the estimated impact—hence, the choice of a quantile regression approach. Estimating the impacts at the median and other quantiles reduces the influence of outliers in driving our estimated results. Besides, if treatment is heterogeneous then estimating the effect for various percentiles of the distribution is helpful in sorting out these issues. Thus, one can estimate the effects at the 25th percentile and also at the 75th percentile to show if there are any significant differences in the tails of the distribution. For the purposes of this paper, the 25th, 50th, 75th and 95th percentiles are estimated.

We have cross-sectional and panel data available for the quantile regression analysis. The cross-section data poses no serious challenges for estimation and it is based on Koenker and Bassett (1978) and Koenker and Hallock (2001). However, our panel data poses some challenges for estimation and is discussed next. Several issues have been raised and researched into with regards to quantile regressions for panel data (some of these studies include but are not limited to, Abrevaya and Dahl, 2008; Canay, 2011; Firpo et al., 2009; Geraci and Bottai, 2007; Koenker, 2005; Powell, 2011; Rosen, 2012; Wooldridge, 2002). Given the following panel specification, there is the problem of how to treat c_i which is the unobserved country effect.

$$Q_\tau(y_{it}|x_{it}) = x_{it}\theta_0 + c_i + u_{it}.$$

Where $Q_\tau(u_{it}|x_{it}) = 0$, i and t subscripts represent country and time, c_i is the unobserved country effect, x_{it} is the explanatory variable, Q_τ is the specific quantile estimated and u_{it} is an error term.

The problem of incidental parameters appears if the fixed effects are estimated (Koenker, 2005; Wooldridge, 2002). This is particularly serious when there are a large number of fixed effects due to a large number of countries or units—leading to parameters being inconsistently estimated (Koenker, 2005; Wooldridge, 2002). The literature suggests the following approaches around the problem. One way, is by using the Chamberlain/Mundlak correlated random effects approach. This helps in reducing the problem of estimating several fixed effects. The unobserved effects are estimated in terms of the averages of the time varying explanatory variables.

$$c_i = \psi_0 + \bar{x}_i\xi_0 + a_i;\ y_{it} = \psi_0 + x_{it}\theta + \bar{x}_i\xi_0 + \upsilon_{it}$$

where $\upsilon_{it} = a_i + u_{it}$ is the composite error term. A variation of this approach is presented by Abrevaya and Dahl (2008) for two time periods.

In the Chamberlain/Mundlak approach, we need to impose an independence assumption that is, υ_{it} is independent of the x's. This requires strong independence assumptions to identify the parameters of interest (Wooldridge, 2002). Which Wooldridge (2002) notes that, it implies parallel quantile functions. Two other approaches discussed by Wooldridge (2002) include estimations using time demeaned data $\ddot{y}_{it} = \ddot{x}_{it}\theta_0 + \ddot{u}_{it}$. A pooled quantile regression can also be estimated on differenced data, that is $\Delta y_{it} = \Delta x_{it}\theta_0 + \Delta u_{it}$. The differenced data removes the unobserved component c_i just as the time-demeaned regression does. Doing this allows the regression to be estimated without having to worry about the fixed effects and the problems of incidental parameters that it gives rise to (Wooldridge, 2002).

A fourth approach, is the penalized fixed effects estimator[9] of Koenker (2004, 2005) which attempts at resolving the issue with panel data by adding an additional parameter in the regression that serves as a penalty by reducing the parameter estimates. In the Koenker approach the fixed effects are estimated, however, the inconsistency they add to the parameter estimates are offset by the penalty parameter incorporated in the regression. We however, adopt the Chamberlain/Mundlak correlated RE framework advocated in Wooldridge (2002) for our analysis (in the appendix, table [D.41]), we show the penalized fixed effect, Mundlak and ordinary fixed effect estimates for comparative purposes). The main reason for adopting the Mundlak approach is that, the coefficients lie within the parameter estimates of the penalized and ordinary fixed effect models. Nonetheless, we feel confident in Geraci and Bottai's (2007) assertion that the random effects quantile regression provides a lower bias than the penalized estimator hence the choice of the Mundlak random effects model.

The following two equations are estimated for the cross-section and panel data respectively.

$$Q_\tau(y_i|x_i) = \alpha_\tau^{cs} + \beta_\tau^{cs} AGOA_i + x_i\gamma_\tau^{cs} + \xi_\tau^{cs} + \epsilon_{it} \tag{5.1}$$

$$Q_\tau(y_{it}|x_{it}) = \alpha_\tau^{p} + \beta_\tau^{p} AGOA_{it} + x_{it}\gamma_\tau^{p} + \bar{x}_{it}\xi_\tau^{p} + \eta_t + \upsilon_{it} \tag{5.2}$$

Where $\upsilon_{it} = a_i + \varepsilon_{it}$, $Q_\tau(\epsilon_i|x_i) = 0$, $Q_\tau(\upsilon_{it}|x_{it}) = 0$, $\tau \in (0.25, 0.50, 0.75, 0.95)$ and is to show that the estimated coefficients are for different quantiles. p and cs are for pooled and cross-section respectively.

The regressors included in the quantile regression are chosen based on the empirical gravity regression. Given our inability to incorporate the country-year fixed effects as suggested by Baier and Bergstrand (2007), we instead include the weighted distance variable which has been used in the

[9]Lamarche (2010) & Geraci and Bottai (2007) have some monte-carlo evidence on the various estimators (includes, the penalised quantile regression, feasible quantile regression, fixed effect quantile regression, pooled quantile regression and quantile random effects). According to Lamarche (2010) penalized methods can be applied to a broader range of models. Secondly, it does not introduce a bias and reduces the "variability of the fixed effects estimator". Geraci and Bottai (2007) on the contrary find that there is a range of penalty values that leads to zero bias in the fixed effects estimator. Values outside this feasible range do lead to a large bias in the estimated parameters. However, the random effects quantile regression provides a lower bias than the penalised estimator when the errors are normal.

gravity literature as a crude way of controlling for the multilateral resistance terms of Anderson and van Wincoop (2003). Generally, the exclusion of the country-year fixed effects leads to inconsistent estimates as the multilateral resistance terms have not been accounted for in the gravity regression.

An alternative approach to solve the problem of the multilateral resistance terms has been suggested by Head et al. (2010) (and also in Head and Mayer (2013)) which requires the dependent variable of the gravity regression to have a reference exporter and importer country. The method known as *Tetrads* requires defining a new dependent variable—a *"tetradic"* term of the ratio of exports from country i to n and l to n. The reference exporter is thus applied to the numerator and the reference importer to the denominator—this is the case for bilateral two-way trade gravity regressions. Thus the dependent variable becomes,

$$\frac{X_{in}/X_{ik}}{X_{ln}/X_{lk}}.$$

Where the subscript "in" indicates exports from country i to n and the reference exporter is l and the importer is k. Head et al. (2010) and Head and Mayer (2013) suggest that this attenuates the bias of omitting the country-year fixed effects. Essentially, the procedure can lead to the multilateral terms cancelling out and thus not requiring the terms to be estimated. In our application here, we only consider exports in one-direction, that is exports to the USA. Thus, our ratio of exports to the USA divided by exports to the EU or ROW is useful in approximating the *Tetrads* approach. Besides, we note that in all the quantile regressions estimated, year dummies are included which proxy part of the country-year fixed effects. Nonetheless, we argue that, the inclusion of the Mundlak terms incorporates elements of the country fixed effects in our regressions and this is helpful in adjusting for the multilateral resistance terms in the gravity equation. The approach undertaken here, therefore attenuates the bias of not having fixed effects in our quantile regression due to the inconsistency that might be introduced as a result of incidental parameters (the fixed effect estimates are presented in the appendix for comparative purposes).

Equation (5.1) is the first of our structural quantile estimating equations for the cross-section. The controls include gravity type variables namely, dummies for english, spanish and landlocked, the logs of distance, area and GDP. Equation (5.2) on the other hand, represents our estimating equation for the panel data. The same covariates used in equation (5.1) are used in the panel case. These are then augmented with the means of the time varying covariates for each country i as well as time effects (η_t) to account for changes in preferences offered and market demand shocks. Additionally, using the structural quantile estimation allows for a simple test of the equality of the coefficients across the various quantiles. That is, the null hypothesis $\beta^{cs}_{0.25} = \beta^{cs}_{0.50} = \beta^{cs}_{0.75} = \beta^{cs}_{0.95}$ and $\beta^{p}_{0.25} = \beta^{p}_{0.50} = \beta^{p}_{0.75} = \beta^{p}_{0.95}$ are tested for the cross-section and panel respectively. A rejection of the null hypothesis implies that the effects of the preference vary across the various quantiles estimated and implies that the impact is heterogeneous.

5.4 Results and discussion

The quantile estimation results are presented in this section. There are two sets of results based on a (a) cross-section and (b) panel dataset of countries. The cross-section result is based on the means of the variables over the post-AGOA period. The panel results on the other hand, are based on each year of data post AGOA. The panel results allow us to control for time as well as the annual revisions for AGOA. Similar to the previous chapter (chapter 4), the treated groups are compared (a) All AGOA: all countries that have been provided with the preference over the period (b) Always AGOA: countries that have remained in the programme since it started (c) In & Out AGOA: countries that have at least had their preference revoked once (some of these countries have been accepted back into the programme) and (d) AGOA & EBA: countries having both the AGOA and EBA preferences. Further tables testing the robustness and sensitivity of the results presented here are in the appendix (appendix D). The cross-section results are discussed next.

5.4.1 Cross-section results

All tables in this section include the following set of covariates—dummies for English speaking, Spanish speaking and landlocked countries, natural logs of weighted distance, area and gross domestic product (GDP). Table (5.1) provides results for total exports to the USA (columns 1 – 4), the USA to EU export ratio (columns 5 – 8) and the USA to ROW export ratio (last four columns). The only significant estimate reported in the table is at the 95th quantile for the countries that have at least had their AGOA status revoked based on the USA to EU export ratio[10]. The estimate indicates that at the 95th quantile, the export ratio is 2.2 points lower for the treated countries relative to the control countries. One explanation for the negative coefficient is that, the in & out group due to the revocation of their preferences face more uncertainty in terms of their AGOA preferences. The uncertainty surrounding their AGOA status can have a dampening effect on their exports to the USA. Majority of these countries for example, Ivory Coast, Congo (DR), Guinea, Niger, Mali, Guinea Bissau and Eritrea have more consistent exports to the EU. Thus they end up having a smaller export ratio when compared to the control countries.

The graphs of the quantile estimates can provide useful information on the location and shape of the quantile distribution thereby providing us with additional information about the differences between the AGOA and non-AGOA recipients (see for example Hao and Naiman, 2007). Hao and Naiman (2007) note that a pure location shift is represented by a horizontal line of the quantile coefficients. They further note that, the scale shifts are indicated by the slope of the quantile coefficient plot—a positively sloped curve indicates an increase in the scale while a decrease in the scale is represented by a negatively sloped curve. Identifying the location and shape of the quantile plot allows inference to be made as to whether the quantile coefficients estimated remain the same at all quantiles or increase (or decrease) in scale across the estimated quantiles. This is useful in determining where the impact is largest. The graphs shown in this section, show a combination of scale and location shifts. We are unable to say anything about the skewness—as the plots provide very limited information concerning the skewness of the coefficients (Hao and Naiman, 2007). In most applications, this has to be calculated and formally tested to determine the changes in the skew

[10]In this chapter non-treated, counter-factual and control countries are used interchangeably. These all refer to the non-AGOA countries maintained in the analysis. The use of the word average is not referring to the OLS mean estimate but the reference here is because the data is an average over a 10 year period. The interpretation of the coefficients are thus at the points of the distribution for which they are estimated. The coefficients are transformed using the exponent of the coefficient (that is, $\exp^{\beta}$). In some cases, we express this as a percentage and the calculation is $(\exp^{\beta} - 1) \times 100$. These two definitions are used interchangeably through the text. We indicate percentage changes when the percentage is negative or if the positive change is not very large. We reserve the first definition for those large changes as shown in this section and the rest of the chapter.

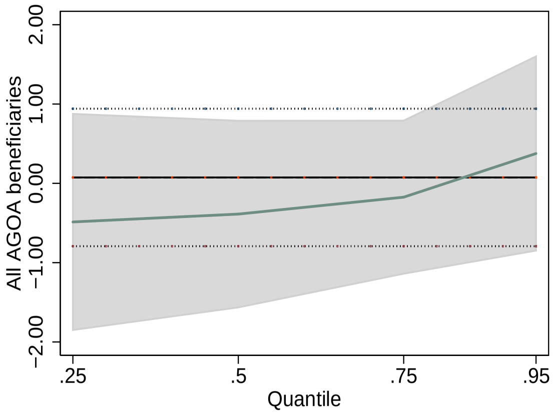
of the quantile coefficients. This is however, not important to our analysis and the location and shift in scale shown are sufficient to provide us the required information to discuss the estimated quantile coefficients. We therefore focus on the location and scale (or spread) shifts that are observable from the graphs. The estimated quantile coefficient is shown on the vertical axis while the value of the specific quantile estimated is shown on the horizontal axis.

Figure (5.3) summarises our quantile estimates for selected estimates in table (5.1). The thick black solid horizontal line between the two dotted horizontal lines represents the OLS coefficient estimate. The area between the two horizontal dotted lines represent the OLS 95% confidence interval. The second solid line represents the quantile estimates. The shaded grey area encompassing this line is the 95% confidence interval for the quantiles shown on the horizontal axis. As long as the quantile estimates lie between the lower and upper confidence intervals of the OLS estimate we can reasonably conclude that, the estimated quantiles are not significantly different from each other. In the figure, the quantile estimates do not not go beyond the OLS confidence limits and thus at the 95% interval, we are unable to reject any differences in the quantile estimates. This can also be seen in the two tables below, as most of the estimated coefficients are not significantly different from zero.

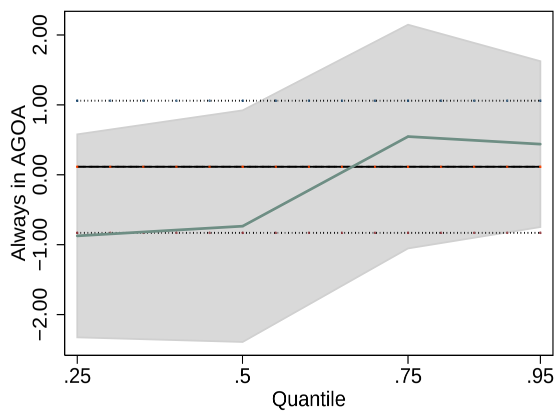
Table 5.1: Quantile regression estimates for exports to the USA

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Total exports to USA				USA/EU export ratio				USA/ROW export ratio			
	All	IN & OUT	Always	EBA & AGOA	All	IN & OUT	Always	EBA & AGOA	All	IN & OUT	Always	EBA & AGOA
q25												
All AGOA	-0.487				-0.592				0.0625			
	(0.666)				(0.482)				(0.649)			
In & Out AGOA		0.452				0.239				0.583		
		(1.604)				(1.221)				(1.328)		
Always in AGOA			-0.874				-0.461				-0.0300	
			(0.753)				(0.512)				(0.593)	
EBA & AGOA				-1.080				-0.579				-0.597
				(0.756)				(0.591)				(0.744)
Constant	-36.24*	-34.93	-32.33*	-25.05	-25.62	-37.30	-14.45	-25.18	-13.51	-10.85	-10.03	-6.160
	(14.264)	(20.982)	(13.244)	(16.939)	(15.953)	(22.665)	(17.144)	(17.729)	(15.492)	(21.657)	(14.857)	(17.808)
q50												
All AGOA	-0.388				-0.686				0.255			
	(0.576)				(0.597)				(0.462)			
In & Out AGOA		-0.0418				-1.023				0.419		
		(1.437)				(1.019)				(1.122)		
Always in AGOA			-0.735				-0.800				0.355	
			(0.663)				(0.684)				(0.520)	
EBA & AGOA				-1.452				-0.927				-0.524
				(0.794)				(0.774)				(0.703)
Constant	-36.05**	-29.16*	-31.43*	-28.65	-17.54	-9.445	-14.60	-17.85	-17.35	-20.13	-8.969	-10.21
	(12.287)	(14.161)	(15.440)	(15.168)	(8.986)	(17.145)	(12.025)	(13.963)	(13.828)	(17.486)	(14.256)	(15.364)
q75												
All AGOA	-0.174				-1.438				0.427			
	(0.652)				(0.782)				(0.530)			
In & Out AGOA		-0.487				-1.418				0.201		
		(1.054)				(0.909)				(1.109)		
Always in AGOA			0.547				-0.993				1.062	
			(0.766)				(0.990)				(0.556)	
EBA & AGOA				-0.294				-2.068				0.619
				(1.305)				(1.428)				(1.114)
Constant	-14.42	-12.80	-14.32	-31.85	-11.13	0.949	-4.438	-7.542	-13.65	-21.68	9.414	-1.934
	(15.329)	(12.003)	(16.811)	(19.644)	(13.134)	(15.383)	(20.704)	(17.908)	(14.101)	(17.284)	(15.565)	(18.432)
q95												
All AGOA	0.376				0.0528				-0.364			
	(0.639)				(1.093)				(0.922)			
In & Out AGOA		-0.956				-2.173*				-1.107		
		(0.794)				(0.923)				(1.382)		
Always in AGOA			0.439				0.0528				-0.500	
			(0.716)				(1.017)				(1.117)	
EBA & AGOA				-0.477				0.668				0.269
				(1.487)				(1.982)				(1.841)
Constant	-27.77	-20.47	-32.07	-43.28*	17.73	16.95	17.73	22.67	-23.37	-14.59	-13.50	-20.54
	(16.240)	(12.020)	(17.336)	(19.553)	(25.776)	(15.342)	(24.779)	(26.490)	(17.887)	(18.395)	(19.370)	(26.698)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	75	41	62	50	75	41	62	50	75	41	62	50

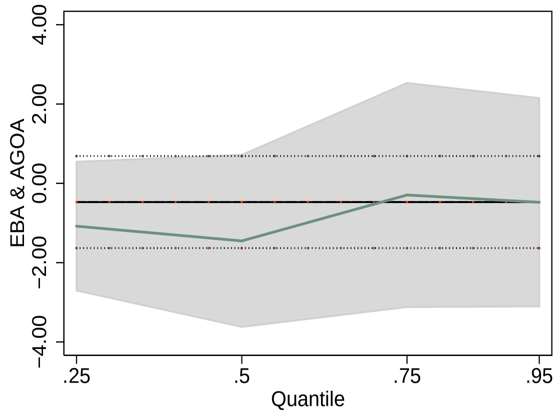
Bootstrapped standard errors with 500 replications in parenthesis. Dependent variable is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. First four columns are for exports to the USA, second four columns are for USA/EU and last four columns are USA/ROW export ratios $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$



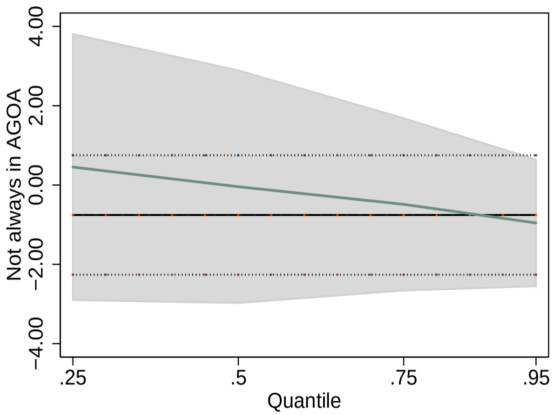
(a) All AGOA: USA



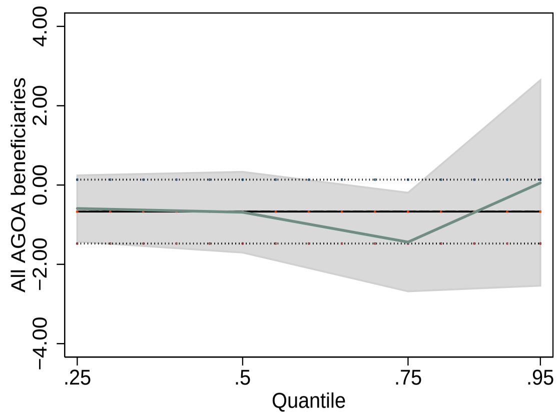
(b) Always AGOA: USA



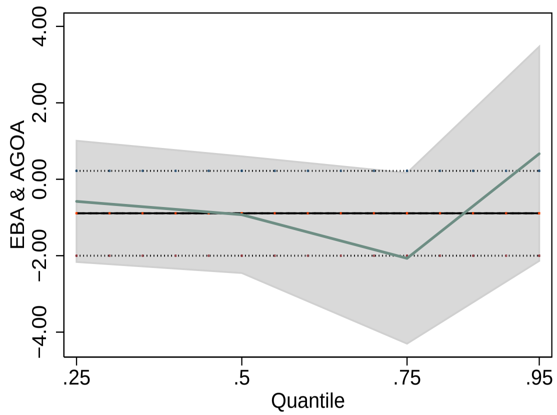
(c) EBA & AGOA: USA



(d) In & Out: USA



(e) All AGOA: USA/EU



(f) EBA & AGOA: USA/EU

Figure 5.3: *Estimated quantiles with confidence intervals: based on Table 5.1*

5.4.2 Product analysis

Tables (5.2) – (5.9) show the results for the eight products introduced in chapter (4). To recap, these products are: (1) Agriculture, meat and dairy, & seafood (AMDS): HS 1–10, 12–14; (2) Food, beverages, tobacco, wood, & paper (FBTWP): HS 11, 15–24, 44–48; (3) Extractive industries (EI): HS 25–27, 68–71 (4) Chemicals, plastics, & rubber (CPR): HS 28–36, 38–40; (5) Textiles, apparel, leather, & footwear (TALF): HS41–42, 50–65; (6) Iron, steel, and other metals (ISOM): HS 26, 72–83; (7) Machinery, electronics, & transportation equipment (METE): HS 84–89; (8) Other industries (OI): HS 37, 43, 49, 66–67, 90–97.

The first four tables present results for the exports to the USA for each treated category while the final four tables show the results for the USA to EU export ratio. Table (5.2) shows a significant and negative estimate for textiles, apparel, leather and footwear (TALF) products at the 75th quantile for the countries in and out of AGOA. The estimate, significant at the 5% level implies that, the treated countries export 99.7% less exports to the USA relative to the non-AGOA countries in the sample, on average and *ceteris paribus* at the 75th quantile. In table (5.3) the reported estimate for EI is positive and significant at the 1% level for all AGOA countries. The reported estimate is 3.6 which implies that, the treated countries export 37 times what the non treated countries export, on average and all things equal at the 95th quantile. The EI result is driven by the large AGOA oil exporters (that is, Nigeria, Angola, Congo Republic and Gabon). Nigeria, Angola and Congo Republic are among the top five largest AGOA exporters and hence the positive impact observed at the 95th quantile is largely driven by the oil exports.

Table (5.4) produces a few more significant estimates than the earlier two tables. The chemical, plastics and rubber (CPR) cluster has three significant estimates at the 1% and 5% levels for the 25th, 50th and 75th quantiles. Other industry (OI) products has one significant estimate at the 5% level at the 95th quantile. All the four estimates are negative implying that the treated countries on average export less than the non treated countries. These results are for countries that have both EBA and AGOA preferences. The competing nature of these two preferences does imply that, the treated countries export more of the two products to the EU relative to the USA compared to the non-AGOA countries. All things equal, for CPR products the treated countries export 81.8%, 94.4% and 89.7% less than the non treated countries export to the USA. Also, the treated countries all things equal, export 89.1% less OI products than the non treated countries export to the USA.

In table (5.5) the always AGOA treated group report significant estimates for CPR products at the 50th quantile and EI exports at the 95th quantile. The coefficient for CPR products is negative while for EI products it is positive. The negative estimate of -1.63 at the median implies that the treated countries have 80.3% less CPR product exports relative to the control countries at the median. On the contrary, the positive estimate of 3.61 implies that the treated countries export 35.9 times the EI products the control countries export to the USA on average and ceteris paribus at the 95th quantile. This estimate is quite similar to the estimate obtained at the 95th quantile for all the AGOA countries. An indication that the countries that are unable to consistently maintain their AGOA status have had a relatively marginal effect on the impact at the top of the distribution.

The next four tables (tables 5.6–5.9) are based on the USA to EU export ratio. Compared to the previous four tables, they report a few more significant estimates. The definition of the dependent variable allows a comparison of exports by each country to the USA and to the EU at each point of the export distribution. One reason for maintaining the USA to EU export ratio is because it approximates the *Tetrads* approach of Head and Mayer (2013); Head et al. (2010). The interpretation of the coefficients can be similar to the interpretation and inference above. However, given that the dependent variable is defined as a log ratio we can interpret the resulting parameter estimate as a triple difference-in-difference estimate. In this case, not only are we comparing estimates across treated and control categories but also across the EU and USA markets. We use this latter form in interpreting our results in this section. In effect, the large exporters to the USA if they are not major exporters to the EU would remain at the top of the distribution while the small exporters who export a lot more to the EU would remain at the bottom of the distribution. The distributional quantiles are thus determined by the new dependent variable. In table (5.6), agriculture, meat, dairy and seafood (AMDS) and CPR products are significant at the 5% level and negative at the 75th and 95th quantiles for both products for the countries in and out of AGOA. Table (5.7) indicates significant and negative coefficients for AMDS, FBTWP at the 50th, 75th and 95th quantiles while CPR is significant at the 75th quantile. Machinery, electronics and transportation equipment products are also significant and negative at the 50th and 75th quantiles for all AGOA countries. Table (5.8) reports two negative and significant estimates for AMDS and FBTWP for countries simultaneously receiving EBA and AGOA preferences.

The final table for the cross-section data shows that countries that always have their AGOA status, have a negative and significant coefficient for AMDS (50th, 75th and 95th quantiles), FBTWP (50th and 95th quantiles) and CPR (50th quantile). Based on tables (5.6) to (5.9), we find AMDS to be significant in all four tables while FBTWP and CPR are significant in three of the four tables. The negative estimates indicate that the export ratio is lower for the treated countries relative to the control countries, all things equal. An implication of this negative estimate is that the treated countries export more of these products to the EU relative to the USA when compared to the control countries. Another implication of the result is that, the treated countries not having the EBA preference contribute more exports to the EU relative to the USA compared to the control countries. In this case, the countries outside the EBA group are beneficiaries of the EU-ACP preferences[11]. As expected the AMDS estimates indicate relatively higher exports of agricultural produce to the EU relative to the USA in comparison to the control countries. A result partly due to the favourable banana tariff regime under the EU-ACP agreement.

Figures (5.4)–(5.9) provide a graphical summary of the tables below (excluding tables 5.2 & 5.6). Extractive industry export estimates in figures (5.4–5.6) noticeably rise above the upper confidence limit of the OLS estimator. Additionally, AMDS and FBTWP estimates at the 95th quantiles lie below the lower confidence limit in figure (5.7). Thus apart from these estimates all remaining estimates show no statistical difference across the estimated quantiles and lie within the confidence bounds of the OLS estimate in each case.

[11]The EU-ACP preferences ended in 2008. Within the EU; Germany, Netherlands, Denmark, Luxembourg and Belgium were opposed to the banana preferences (Bessko, 1996, 282). Costa Rica, Colombia, Ecuador, Nicaragua, Guatemala and Venezuela brought the banana case before the dispute settlement body (DSB) (see www.wto.org). The USA also joined the complainants to challenge the banana import regime of the EU. As a result of the cases brought before the WTO, the EU had to end the banana import regime. For a history of the banana dispute during the GATT regime and under the WTO see `http://www.wto.org/english/tratop_e/dispu_e/cases_e/ds27_e.htm`. Bessko (1996); Pelzman (1999); Simi and Kaushik (2008) provide a discussion of the banana dispute.

Table 5.2: Quantile regression estimates for exports to the USA

	(1) AMDS	(2) FBTWP	(3) EI	(4) CPR	(5) TALF	(6) ISOM	(7) METE	(8) OI
q25								
In & Out AGOA	-0.476	1.099	0.183	1.334	3.251	0.899	1.215	1.150
	(1.949)	(2.654)	(2.134)	(2.321)	(2.587)	(1.649)	(1.445)	(1.740)
Constant	-68.23*	-44.43	33.88	-43.81	-124.5*	11.41	2.252	-22.76
	(32.648)	(35.607)	(28.862)	(31.574)	(50.830)	(36.161)	(28.435)	(33.457)
q50								
In & Out AGOA	-0.159	0.853	0.928	-1.282	0.444	0.917	0.494	0.0403
	(1.627)	(2.316)	(1.513)	(2.155)	(2.980)	(2.067)	(1.226)	(1.155)
Constant	-45.11	-30.30	11.83	-39.57	-97.28	-5.761	6.822	-27.66
	(27.744)	(28.908)	(17.946)	(24.585)	(49.478)	(32.370)	(27.615)	(23.207)
q75								
In & Out AGOA	-1.404	0.504	-0.111	-1.490	-5.892*	0.828	0.630	0.678
	(1.380)	(2.095)	(1.107)	(1.403)	(2.860)	(3.018)	(1.338)	(0.918)
Constant	-39.23	-47.48	15.68	-26.99	-66.75	-30.92	-20.39	-42.69*
	(25.490)	(26.782)	(15.851)	(21.878)	(37.897)	(36.462)	(30.358)	(20.721)
q95								
In & Out AGOA	-1.531	3.482	0.382	-0.257	-4.947	4.764	0.628	1.133
	(1.325)	(2.146)	(1.150)	(1.252)	(2.567)	(4.341)	(1.560)	(1.731)
Constant	-35.91	-35.86	10.42	-31.80	-52.22	-55.07	-48.29	-73.62*
	(25.411)	(25.211)	(14.387)	(23.363)	(38.083)	(50.858)	(30.849)	(30.330)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41	40	39	41	41	40	41	41

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; ATLF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.3: Quantile regression estimates for exports to the USA

	(1) AMDS	(2) FBTWP	(3) EI	(4) CPR	(5) TALF	(6) ISOM	(7) METE	(8) OI
q25								
All AGOA	0.0421	1.008	-0.172	-0.928	-1.361	-0.649	-0.141	-0.672
	(0.760)	(1.033)	(1.158)	(0.860)	(1.564)	(0.778)	(0.698)	(0.773)
Constant	-36.88*	-19.48	-24.81	-18.43	-86.26*	8.083	19.81	-7.456
	(17.233)	(17.020)	(25.964)	(16.940)	(41.229)	(17.817)	(12.643)	(16.910)
q50								
All AGOA	-0.327	-0.302	0.421	-1.491	-0.832	-0.262	-0.892	-0.749
	(0.782)	(0.720)	(1.034)	(0.799)	(1.494)	(0.981)	(0.646)	(0.603)
Constant	-31.96*	-19.02	2.977	-32.98*	-47.92*	-5.042	11.18	-24.27*
	(13.170)	(11.264)	(20.583)	(15.382)	(23.806)	(24.757)	(12.734)	(11.652)
q75								
All AGOA	0.319	-0.305	1.114	-1.157	-2.843	0.965	-0.811	-0.341
	(0.734)	(0.863)	(1.029)	(0.677)	(1.785)	(1.228)	(0.839)	(0.630)
Constant	-34.71*	-35.30*	-2.522	-34.54*	-64.41*	-56.10	1.566	-20.63
	(13.772)	(13.795)	(19.207)	(16.708)	(25.469)	(32.156)	(14.771)	(12.318)
q95								
All AGOA	-0.954	1.646	3.639***	-0.896	-2.170	0.445	-0.182	-0.260
	(0.904)	(1.191)	(0.959)	(1.182)	(1.848)	(1.507)	(1.070)	(1.094)
Constant	-36.54*	-42.57	-3.798	-38.73	-71.03**	2.774	-29.99	-27.23
	(14.621)	(24.204)	(22.258)	(31.540)	(26.698)	(35.206)	(22.329)	(19.083)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	75	72	73	74	75	72	75	75

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; ATLF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.4: Quantile regression estimates for exports to the USA

	(1) AMDS	(2) FBTWP	(3) EI	(4) CPR	(5) TALF	(6) ISOM	(7) METE	(8) OI
q25								
EBA & AGOA	0.675	0.347	-1.512	-1.703*	-0.831	-1.408	-0.997	-0.871
	(1.428)	(1.151)	(1.271)	(0.839)	(1.977)	(1.134)	(0.830)	(0.947)
Constant	-59.41	-26.45	11.20	1.627	-137.7*	5.700	1.914	0.119
	(29.593)	(29.090)	(24.445)	(20.802)	(65.631)	(30.637)	(27.571)	(29.511)
q50								
EBA & AGOA	0.158	-0.0459	-1.273	-2.883**	-0.576	-0.252	-1.155	-1.269
	(1.025)	(0.829)	(1.521)	(0.914)	(1.563)	(1.256)	(0.819)	(0.775)
Constant	-33.67	-12.13	2.685	-0.687	-53.22	-29.02	18.73	-7.581
	(18.375)	(23.119)	(25.318)	(23.314)	(41.843)	(32.632)	(20.598)	(18.045)
q75								
EBA & AGOA	0.145	-0.677	0.146	-2.273*	-1.789	1.835	-0.955	-1.245
	(1.017)	(0.981)	(2.045)	(0.979)	(2.107)	(1.621)	(1.103)	(0.777)
Constant	-34.99	-37.76	7.099	-27.10	-46.96	-54.82	-2.911	-18.85
	(17.711)	(19.975)	(24.779)	(20.801)	(37.147)	(32.945)	(25.481)	(16.993)
q95								
EBA & AGOA	-0.870	0.145	2.108	-1.715	-2.111	0.889	-1.285	-2.214*
	(1.472)	(1.259)	(1.955)	(0.943)	(2.547)	(1.791)	(1.454)	(1.064)
Constant	-41.14	-33.87	-3.669	-40.88	-73.55	-31.52	-24.67	-27.95
	(27.174)	(19.850)	(22.574)	(21.782)	(45.780)	(33.332)	(28.851)	(23.544)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	50	49	48	50	50	48	50	50

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; ATLF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.5: Quantile regression estimates for exports to the USA

	(1) AMDS	(2) FBTWP	(3) EI	(4) CPR	(5) TALF	(6) ISOM	(7) METE	(8) OI
q25								
Always in AGOA	-0.499	0.483	-0.975	-1.015	-0.820	-1.505	-0.488	-0.786
	(0.877)	(1.087)	(1.480)	(0.809)	(1.493)	(1.089)	(0.744)	(0.910)
Constant	-46.72	-15.97	-11.30	-12.10	-133.0*	15.51	1.112	-8.358
	(25.572)	(22.995)	(29.809)	(17.306)	(56.781)	(26.081)	(20.704)	(23.834)
q50								
Always in AGOA	-0.794	0.402	0.773	-1.626*	-0.667	-0.227	-1.238	-0.966
	(0.817)	(0.776)	(1.320)	(0.789)	(1.246)	(1.190)	(0.718)	(0.738)
Constant	-29.11	-25.33	2.934	-31.49	-47.62	-12.00	-6.534	-21.80
	(15.834)	(16.161)	(26.366)	(17.781)	(39.359)	(30.934)	(17.820)	(13.779)
q75								
Always in AGOA	-0.328	-0.525	2.144	-1.255	-2.201	0.990	-0.803	-1.050
	(0.755)	(0.919)	(1.361)	(0.698)	(1.743)	(1.346)	(0.901)	(0.663)
Constant	-27.94*	-33.66	-5.733	-41.14*	-36.95	-52.19	-3.089	-27.40*
	(13.120)	(17.085)	(24.476)	(15.759)	(26.524)	(31.104)	(21.483)	(12.353)
q95								
Always in AGOA	-0.915	0.191	3.608***	-1.272	-3.838	1.741	-1.220	-0.494
	(0.975)	(0.696)	(0.884)	(0.711)	(2.030)	(1.330)	(1.179)	(0.818)
Constant	-36.68*	-32.27*	3.554	-46.69**	-30.26	-40.76	13.08	-27.55
	(17.922)	(15.035)	(19.985)	(15.373)	(31.674)	(29.042)	(24.148)	(19.743)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	62	61	60	62	62	60	62	62

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; ATLF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.6: Quantile regression: USA/EU export ratio

	(1) AMDS	(2) FBTWP	(3) EI	(4) CPR	(5) TALF	(6) ISOM	(7) METE	(8) OI
q25								
In & Out AGOA	-1.067	0.387	0.818	1.028	0.571	4.213	-0.296	1.476
	(1.348)	(1.519)	(1.610)	(2.058)	(1.945)	(2.354)	(1.275)	(1.436)
Constant	-39.10	-8.467	-16.93	-54.91	-77.57*	-51.96	14.06	8.846
	(27.789)	(20.647)	(27.497)	(28.279)	(32.352)	(33.925)	(24.845)	(27.870)
q50								
In & Out AGOA	-0.565	-0.428	-1.282	-2.030	-1.828	1.230	0.151	0.134
	(1.076)	(1.158)	(1.405)	(1.576)	(2.096)	(1.759)	(0.800)	(1.079)
Constant	-48.35	2.653	-0.479	-32.43	-39.06	-37.89	12.72	9.083
	(25.283)	(15.642)	(27.529)	(18.854)	(36.076)	(28.763)	(20.327)	(23.843)
q75								
In & Out AGOA	-2.385*	0.0750	0.281	-2.387*	-3.491	1.113	0.283	0.244
	(1.039)	(1.041)	(1.541)	(1.171)	(2.222)	(2.017)	(0.825)	(0.953)
Constant	-18.38	-20.78	21.49	-6.377	-4.322	-9.393	-0.597	0.780
	(21.181)	(17.218)	(30.696)	(17.405)	(40.944)	(30.234)	(19.270)	(20.016)
q95								
In & Out AGOA	-2.551*	-0.904	0.562	-3.459*	-2.907	-1.999	-0.383	1.151
	(1.047)	(0.997)	(1.706)	(1.289)	(2.362)	(2.044)	(0.886)	(0.993)
Constant	-17.81	-35.56	26.27	-9.761	49.73	10.61	-7.887	5.611
	(18.553)	(20.877)	(33.516)	(18.922)	(49.258)	(30.027)	(18.086)	(19.587)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41	40	39	41	41	40	41	41

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variable is the ratio of exports by country i to the USA to their exports to the EU. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; ATLF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.7: Quantile regression: USA/EU export ratio

	(1) AMDS	(2) FBTWP	(3) EI	(4) CPR	(5) TALF	(6) ISOM	(7) METE	(8) OI
q25								
All AGOA	-0.721	-0.907	0.205	0.420	-0.534	-0.616	-0.644	-0.853
	(0.794)	(0.588)	(0.601)	(1.011)	(1.082)	(1.106)	(0.554)	(0.604)
Constant	-20.87	-12.10	-22.57	-24.21	-77.62**	-9.642	13.16	4.750
	(14.833)	(10.571)	(12.752)	(13.539)	(25.414)	(24.298)	(17.616)	(11.214)
q50								
All AGOA	-1.517*	-1.422**	-0.780	-0.588	-1.494	-0.497	-1.080*	-0.824
	(0.627)	(0.520)	(0.686)	(0.767)	(1.258)	(0.690)	(0.422)	(0.588)
Constant	-18.89	-7.266	-11.18	-16.64	-36.12	-11.42	9.363	0.348
	(10.338)	(8.982)	(13.871)	(11.594)	(19.500)	(15.522)	(9.269)	(10.225)
q75								
All AGOA	-2.222***	-1.362**	-0.299	-1.467*	-1.682	-0.543	-0.954*	-0.249
	(0.569)	(0.484)	(0.624)	(0.654)	(1.601)	(0.815)	(0.461)	(0.485)
Constant	-24.46*	-7.350	38.77	-8.200	-22.06	-14.24	-3.301	0.748
	(10.900)	(9.612)	(25.387)	(10.368)	(21.384)	(19.205)	(10.031)	(11.763)
q95								
All AGOA	-2.582**	-2.258**	-0.309	0.421	-1.842	0.147	-0.176	-0.734
	(0.821)	(0.694)	(0.834)	(1.099)	(1.748)	(0.864)	(0.548)	(0.612)
Constant	-8.319	-7.154	48.24	-12.30	-38.37	-4.300	10.82	-5.428
	(13.606)	(14.809)	(30.193)	(20.927)	(27.284)	(19.665)	(14.722)	(13.599)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	75	72	73	74	75	72	75	75

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variable is the ratio of exports by country i to the USA to their exports to the EU. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; ATLF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.8: Quantile regression: USA/EU export ratio

	(1) AMDS	(2) FBTWP	(3) EI	(4) CPR	(5) TALF	(6) ISOM	(7) METE	(8) OI
q25								
EBA & AGOA	-0.263	-1.175	-1.089	-0.355	-0.273	1.045	-0.983	-0.215
	(1.257)	(0.779)	(0.710)	(1.082)	(1.169)	(1.334)	(0.912)	(0.687)
Constant	-26.50	-20.71	-24.64	-13.50	-96.82**	-30.34	5.057	-6.856
	(24.647)	(18.121)	(15.693)	(23.170)	(34.608)	(34.969)	(22.222)	(18.840)
q50								
EBA & AGOA	-1.343	-1.541*	-1.205	-0.754	-0.982	-0.525	-0.859	-0.889
	(0.819)	(0.741)	(0.988)	(1.156)	(1.326)	(0.819)	(0.656)	(0.527)
Constant	-27.89	-12.55	-24.18	-14.09	-27.55	-24.38	3.398	-5.524
	(17.960)	(13.901)	(17.499)	(16.235)	(31.083)	(19.600)	(15.297)	(13.466)
q75								
EBA & AGOA	-2.107*	-0.890	-0.791	-1.593	-1.755	-0.813	-1.193	-0.902

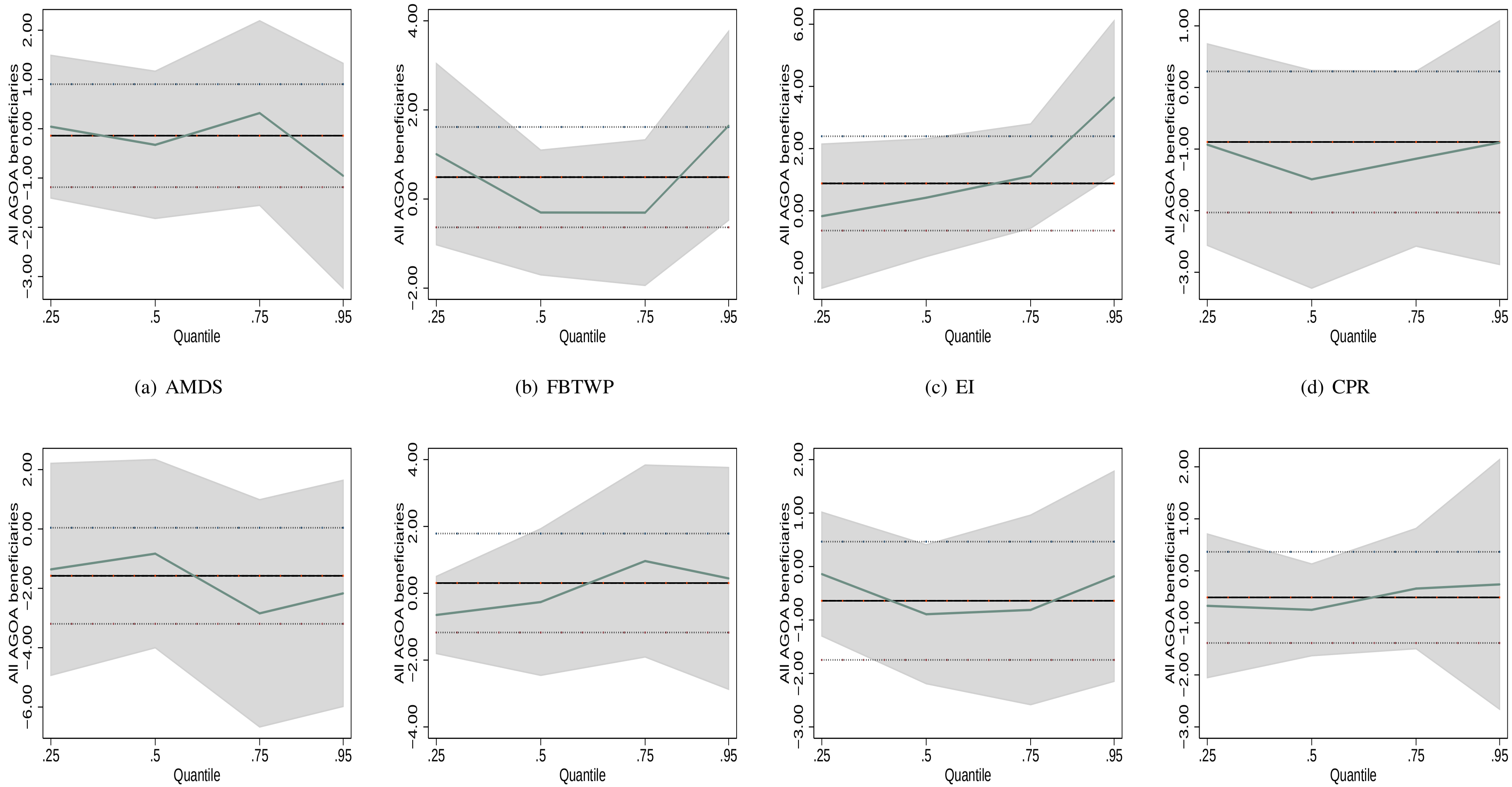
	(0.829)	(0.873)	(1.032)	(1.332)	(1.833)	(1.130)	(0.593)	(0.640)
Constant	-18.54	-19.81	-24.85	-8.662	-18.78	-8.692	-4.155	2.021
	(17.134)	(15.125)	(18.840)	(18.526)	(33.217)	(22.328)	(14.555)	(13.106)
q95								
EBA & AGOA	-2.312	-0.624	1.088	0.572	-0.650	-0.669	-0.695	-0.407
	(1.420)	(1.733)	(1.246)	(1.470)	(2.378)	(1.332)	(0.859)	(1.167)
Constant	-3.841	-27.22	-48.86	-9.601	3.823	-11.41	23.20	5.611
	(24.683)	(23.311)	(30.764)	(23.537)	(52.120)	(23.407)	(18.707)	(18.435)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	50	49	48	50	50	48	50	50

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variable is the ratio of exports by country i to the USA to their exports to the EU. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; ATLF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries. $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Table 5.9: Quantile regression: USA/EU export ratio

	(1) AMDS	(2) FBTWP	(3) EI	(4) CPR	(5) TALF	(6) ISOM	(7) METE	(8) OI
q25								
Always in AGOA	-1.013	-1.182	-0.835	0.400	-1.216	-0.913	-0.420	-0.505
	(0.853)	(0.595)	(0.504)	(0.928)	(1.072)	(1.228)	(0.554)	(0.724)
Constant	-10.55	-14.73	-13.83	-10.51	-85.93*	-8.862	-1.018	-6.392
	(16.953)	(14.344)	(14.008)	(16.126)	(34.115)	(30.560)	(18.449)	(15.183)
q50								
Always in AGOA	-1.682*	-1.236*	-1.071	-0.841	-1.145	-0.624	-0.826	-0.825
	(0.663)	(0.530)	(0.756)	(0.852)	(1.221)	(0.813)	(0.522)	(0.576)
Constant	-18.82	-18.25	-19.77	-10.29	-38.54	-14.95	2.333	-5.757
	(12.049)	(10.960)	(15.427)	(12.377)	(27.435)	(19.708)	(13.610)	(12.198)
q75								
Always in AGOA	-2.112**	-1.018	-0.550	-1.543*	-1.936	-0.585	-0.997	-0.281
	(0.671)	(0.568)	(0.773)	(0.757)	(1.611)	(0.901)	(0.613)	(0.497)
Constant	-13.12	-16.05	-2.442	-6.608	-19.03	-9.388	-10.55	4.567
	(11.092)	(11.122)	(24.535)	(11.917)	(30.084)	(22.422)	(14.669)	(13.099)
q95								
Always in AGOA	-2.466**	-2.258*	0.473	0.366	-1.582	0.498	-0.176	-0.628
	(0.852)	(0.888)	(0.939)	(1.236)	(1.805)	(0.886)	(0.647)	(0.613)
Constant	-4.413	-7.154	-3.099	-6.355	-28.98	9.993	10.82	2.936
	(16.421)	(17.649)	(28.096)	(19.402)	(50.427)	(24.546)	(16.622)	(16.326)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	62	61	60	62	62	60	62	62

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variable is the ratio of exports by country i to the USA to their exports to the EU. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; ATLF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries. $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

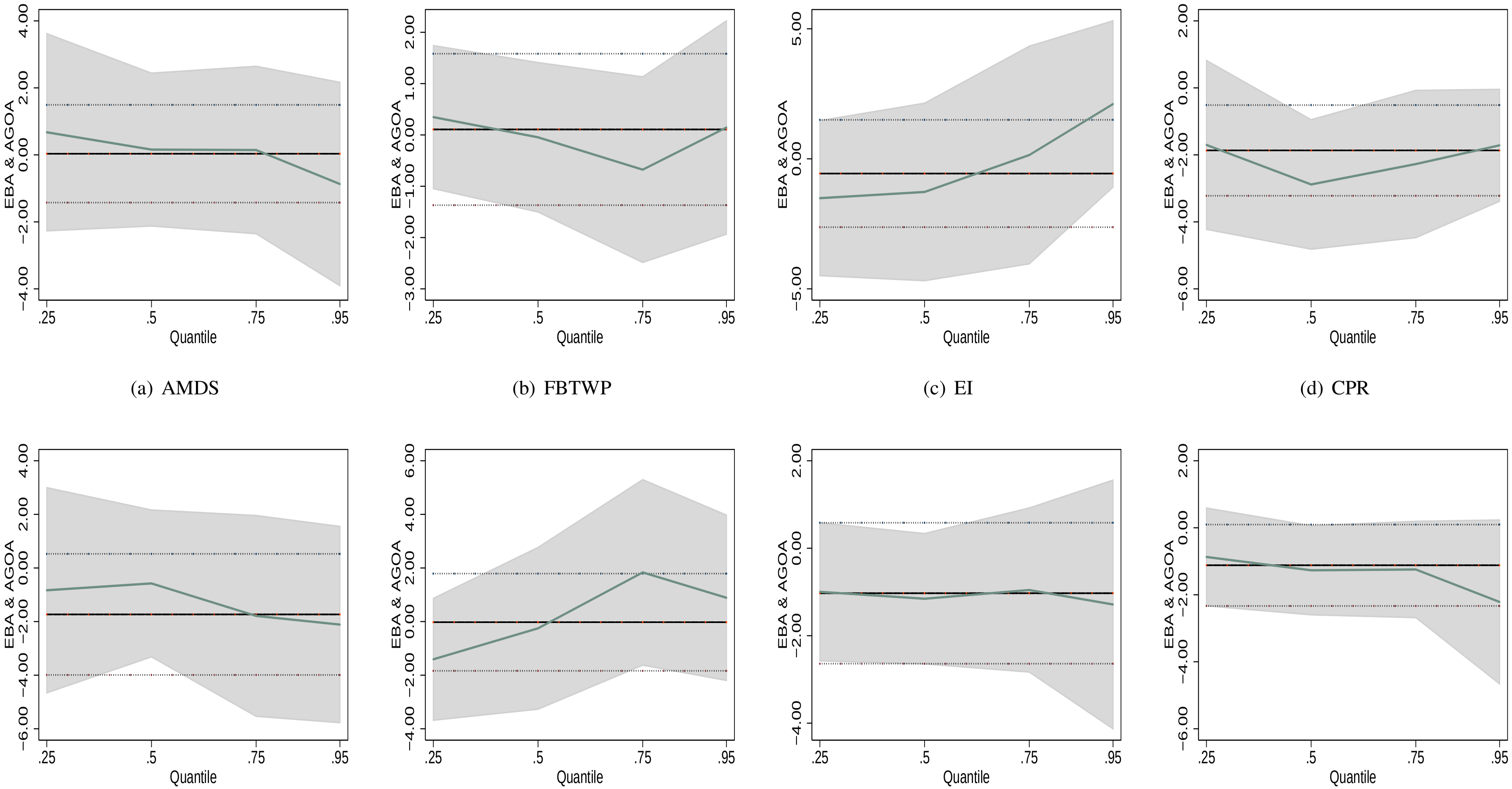


(a) AMDS (b) FBTWP (c) EI (d) CPR

(e) TALF (f) ISOM (g) METE (h) OI

Controls include: English, Spanish & landlocked dummies, logs of distance, area, & gdp. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Figure 5.4: *Estimated quantiles with confidence intervals: based on all countries provided with AGOA, Table 5.3.*

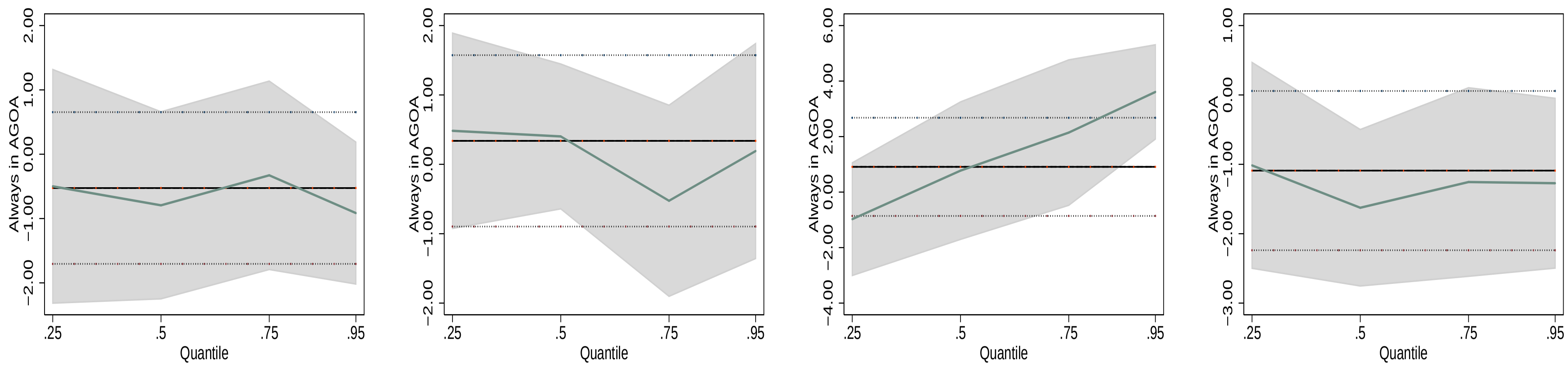


(a) AMDS (b) FBTWP (c) EI (d) CPR

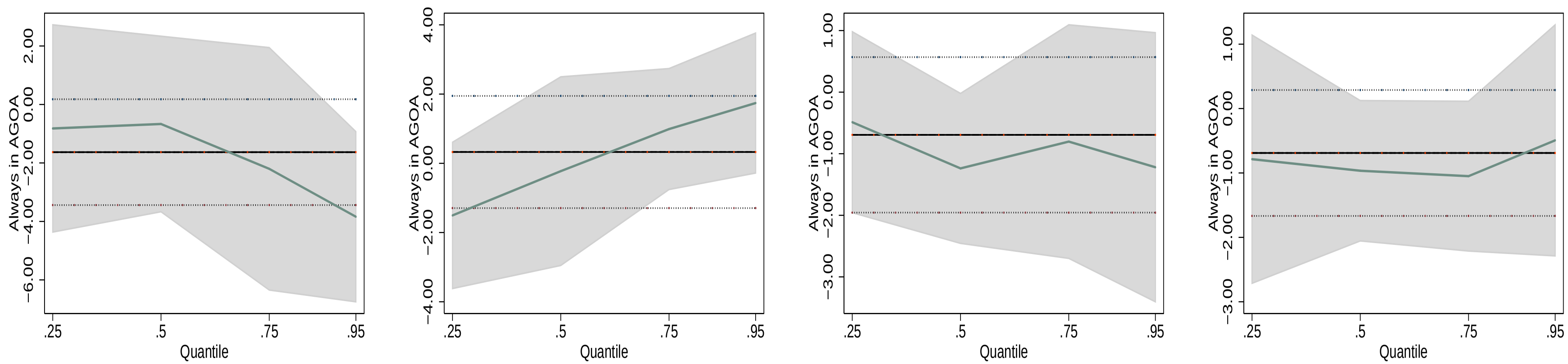
(e) TALF (f) ISOM (g) METE (h) OI

Controls include: English, Spanish & landlocked dummies, logs of distance, area, & gdp. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Figure 5.5: *Estimated quantiles with confidence intervals: based on countries having both EBA & AGOA, Table 5.4*



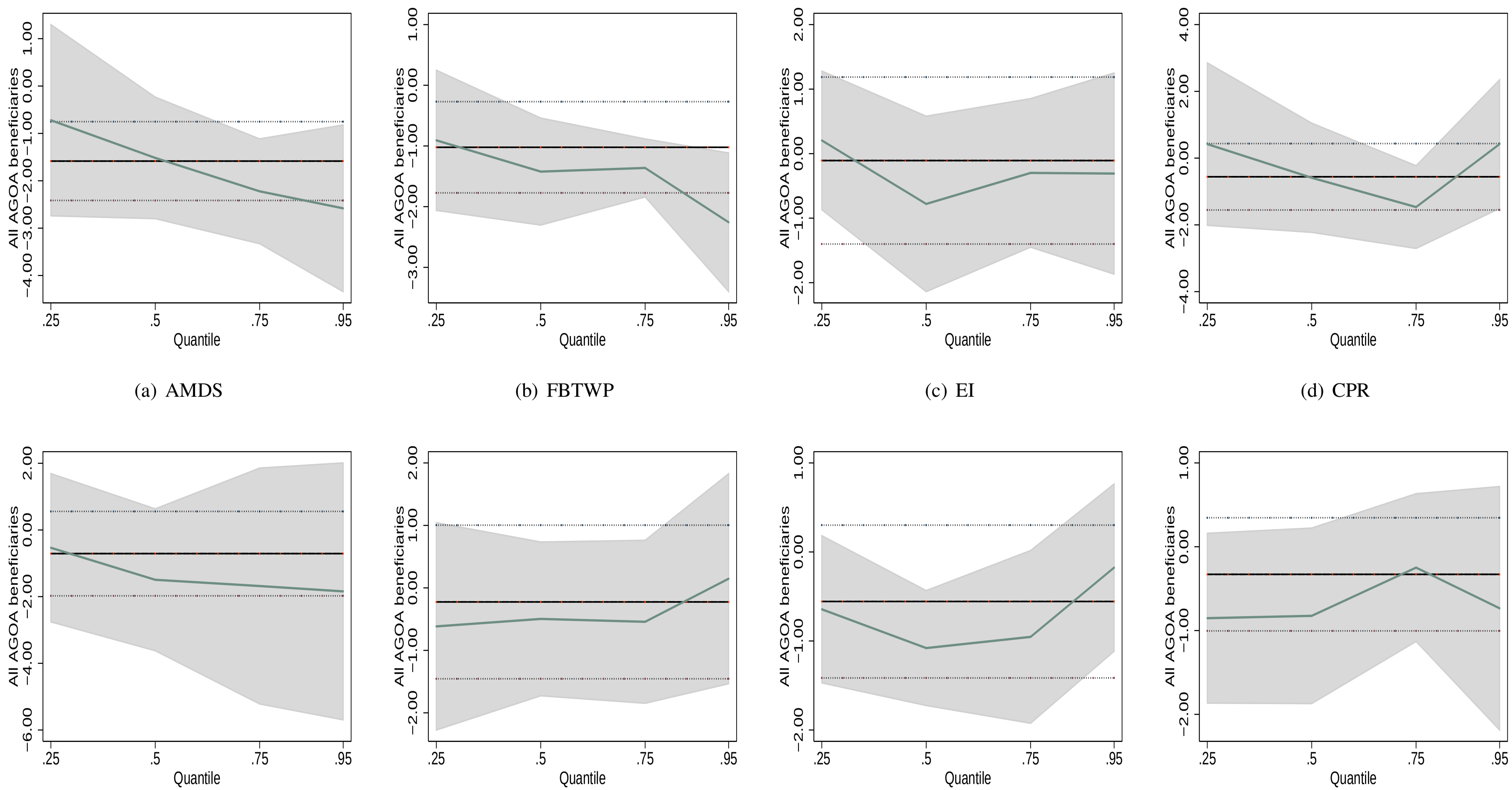
(a) AMDS (b) FBTWP (c) EI (d) CPR



(e) TALF (f) ISOM (g) METE (h) OI

Controls include: English, Spanish & landlocked dummies, logs of distance, area, & gdp. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Figure 5.6: *Estimated quantiles with confidence intervals: based on countries always in AGOA, Table 5.5*

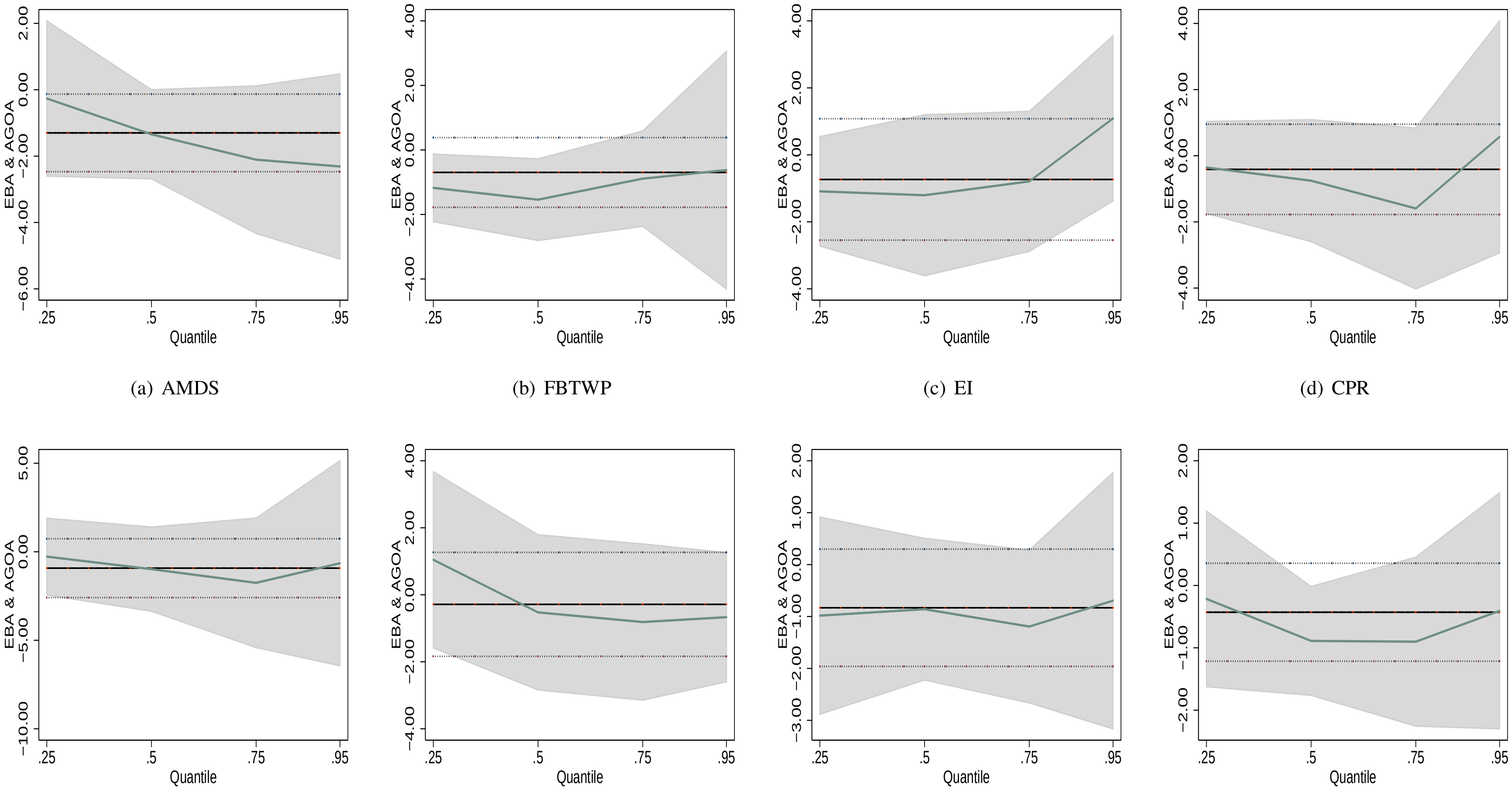


(a) AMDS (b) FBTWP (c) EI (d) CPR

(e) TALF (f) ISOM (g) METE (h) OI

Controls include: English, Spanish & landlocked dummies, logs of distance, area, & gdp. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Figure 5.7: *Estimated quantiles with confidence intervals: based on all countries provided with AGOA (USA/EU), Table 5.7.*

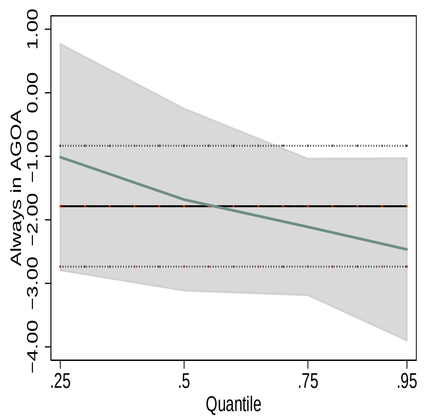


(a) AMDS (b) FBTWP (c) EI (d) CPR

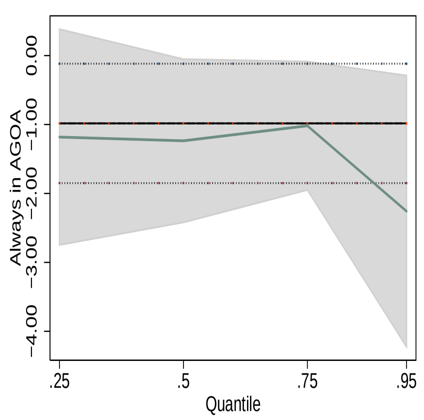
(e) TALF (f) ISOM (g) METE (h) OI

Controls include: English, Spanish & landlocked dummies, logs of distance, area, & gdp. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

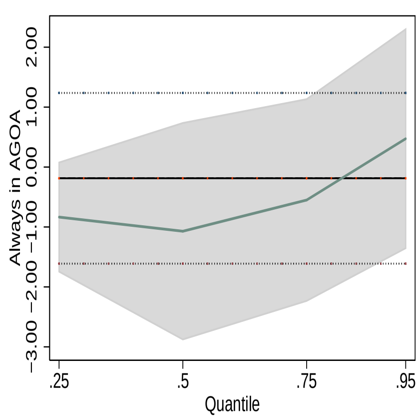
Figure 5.8: *Estimated quantiles with confidence intervals: based on countries having both EBA & AGOA (USA/EU), Table 5.8*



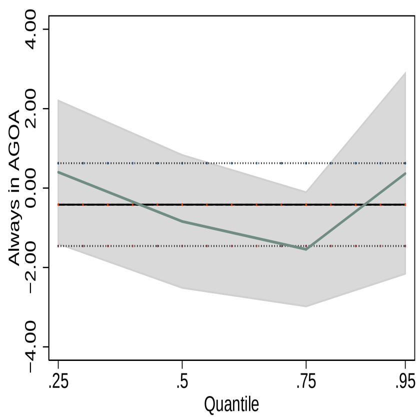
(a) AMDS



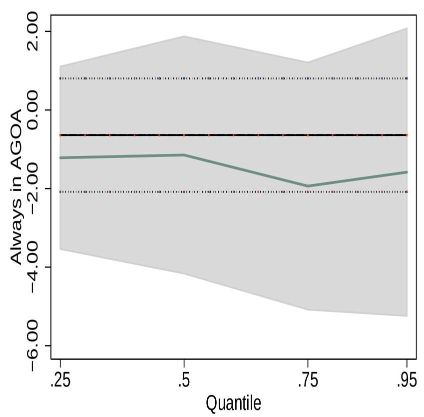
(b) FBTWP



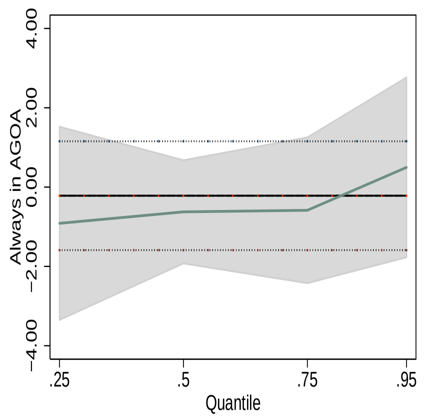
(c) EI



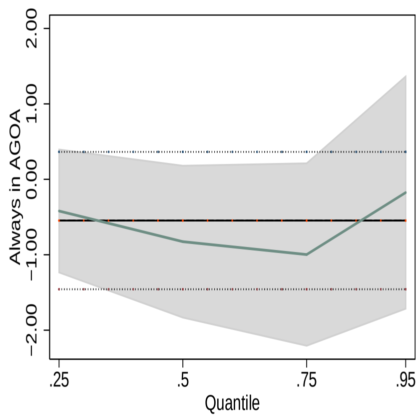
(d) CPR



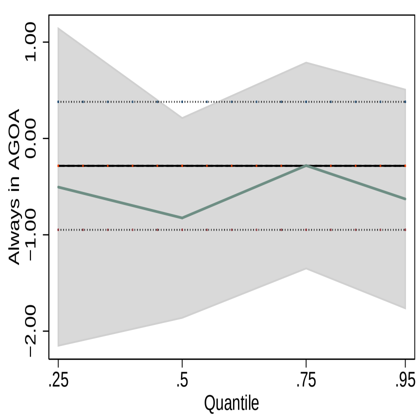
(e) TALF



(f) ISOM



(g) METE



(h) OI

Controls include: English, Spanish & landlocked dummies, logs of distance, area, & gdp. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Figure 5.9: *Estimated quantiles with confidence intervals: based on countries always in AGOA (USA/EU), Table 5.9*

5.4.3 Decomposition of the quantile impact

Figures (5.10) and (5.11) show the decompositions carried out according to Machado and Mata (2005) and Melly (2005). Machado and Mata (2005) have extended the Oaxaca-Blinder decomposition to quantile regressions[12]. Machado and Mata (2005) decompose the wage density into changes due to coefficients, covariates and the residual. These three terms explain the differences in the wage densities of the two groups identified[13]. Melly's (2006) decomposition of the difference between a treated and untreated group at the θ^{th} quantile of the unconditional distribution is given by:

$$\hat{q}_1(\theta) - \hat{q}_0(\theta) = [\hat{q}_1(\theta) - \hat{q}_c(\theta)] + [\hat{q}_c(\theta) - \hat{q}_0(\theta)],$$

where the $\hat{q}_0, \hat{q}_1$ are the quantiles estimated for the control and treated groups respectively and $\hat{q}_c$ is the counter-factual quantile distribution. One could think of the counter-factual distribution of exports as the distribution of exports for the non-AGOA countries had they obtained the same characteristics (or the same level of covariates) as the AGOA countries given their return to exporting to the USA. The initial term in brackets provide the effect of coefficients on the gap between the treated and counter-factual countries. The second term is due to the effect of differences in their covariates[14,15].

To provide a clearer picture of the decomposition method, we note that, the covariates are the explanatory (or independent or characteristics) variables in the relationship. The coefficient is the coefficient reported on the AGOA dummy—this tells us the how different exports are between the two groups. The decomposition then makes a comparison between the two groups (AGOA versus non-AGOA) to determine where the differences originate from. In other words, are the differences we observe between the AGOA and non-AGOA countries a result of the differences in the coefficient on the dummy variable or a result of the differences in their characteristics? For example, both countries could have the same GDP, distance, area or language values—then, the differences we observe are because the estimated coefficients are different. Alternatively, the explanatory variables could be different hence, the differences observed are mainly due to these differences in characteristics. However, in practice the differences tend to be a combination of the two—that is, covariate and coefficient differences. The early applications of this methodology was to labour force surveys to explain differences in wages paid to men and women. The differences were decomposed into differences arising from the coefficients on the gender dummy and differences arising in the characteristics (for example, education, married, and urban variables) between men and women.

In figure (5.10) the total, covariate and coefficient effects on the export gap between the AGOA and non-AGOA countries are shown. A comparison of the counter-factual export distribution for non-AGOA countries with the distribution of exports for the AGOA countries shows that, the coefficient effects are higher for the top quantiles in almost all six cases shown in the diagram. The coefficient effect is also noticeably positive at the top of the distribution for most of the cases.

[12] A variant of this decomposition is described in Melly (2005) and Melly (2006). Melly provides the *rqdeco* stata command to implement the decomposition. For more technical details and a complete description of the decomposition, see Machado and Mata (2005); Melly (2005, 2006).

[13] In this case, the decomposition was for the raw wage gap between men and women.

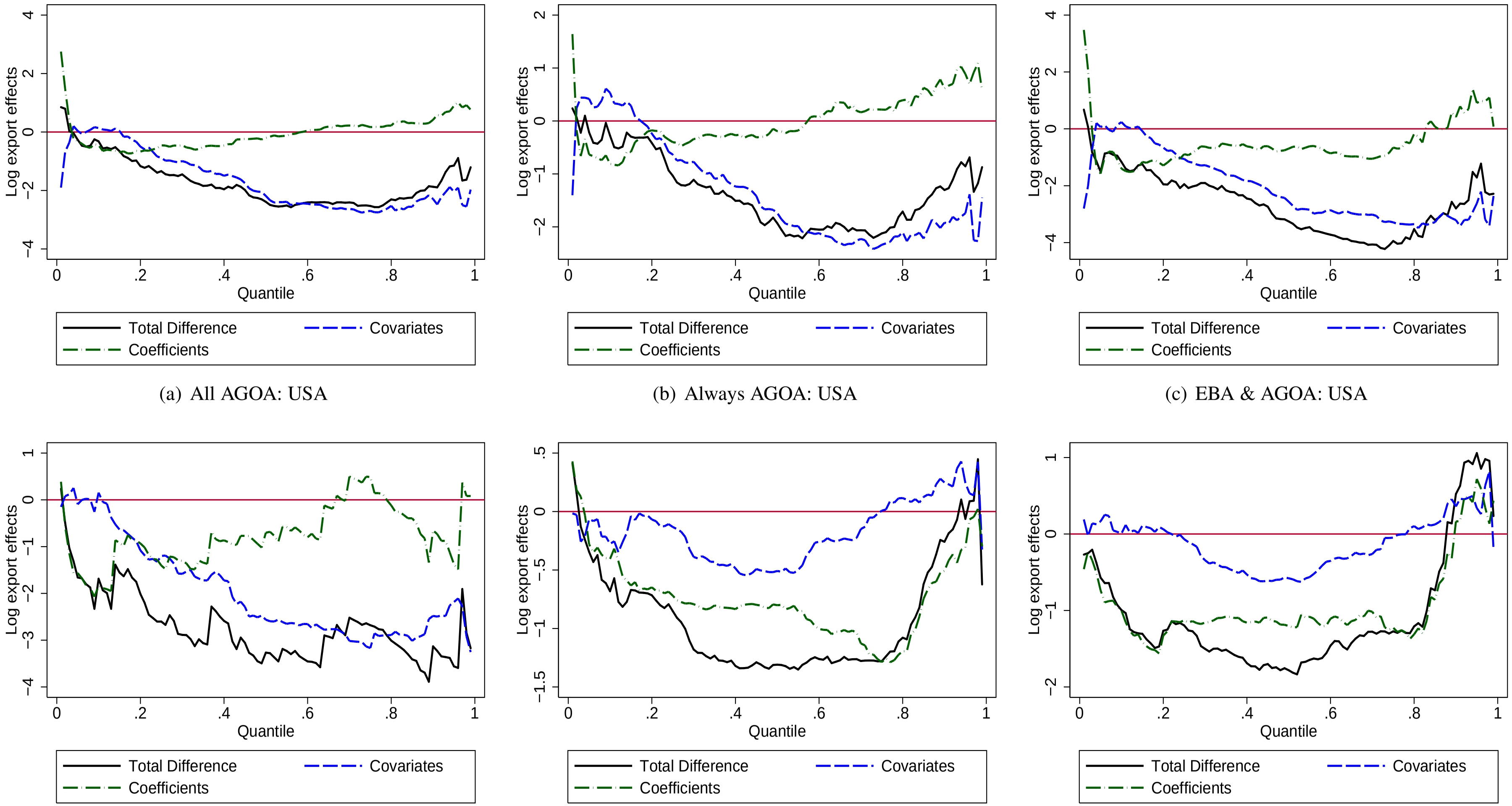
[14] Melly (2006) shows that the first term gives the quantile treatment effect on the treated. Fortin et al. (2010) is another paper showing the similarity of the decomposition to the effects in the treatment literature.

[15] The decomposition by Melly (2006) and Melly (2005) is numerically identical to Machado and Mata's (2005) estimator. As Machado and Mata's (2005) simulations approach infinity identical results are obtained (Melly, 2006).

On the contrary, the covariate difference declines for most parts of the distribution. Although, there is evidence that the covariate effect starts to rise beyond the median it mostly stays below zero. Furthermore, the magnitude of the covariate effect tends to be larger and in some cases its effect at the top of the distribution is twice that of the lower end of the distribution. Nonetheless, the negative covariate effect which exists for almost all quantiles tends to produce the negative total effect observed in the diagram as well as in the results presented in table (5.1). The positive coefficient effects beyond the 70th quantile does not reverse the effect of the covariates on the total effect.

Figure (5.11) presents the coefficient effects together with its 95% confidence interval. The difference in the impact of the coefficients on the export gap between the AGOA and non-AGOA countries is now more evident. The effects of the coefficients tend to vary across the distribution and is positive mostly at the upper tail of the distribution of the export gap.

Based on the graphs below, the observed impacts at the various quantiles are driven by a differing combination of coefficient and covariate effects. The effects are generally not homogeneous and differ depending on which part of the export distribution is analysed. In the decomposition literature cited above, the coefficient effect is normally interpreted as a price effect. However, in our case, we do need to control for quota restrictions, rules of origin, transport costs and other unobserved factors that influence the amount of exports by these groups. Clearly, delineating these would help in identifying the price effect more clearly and to attribute the coefficient gap to the price differential resulting from clearly higher prices received by AGOA exporters due to the lower tariffs relative to the control countries. In other words, the difference between the AGOA and non-AGOA countries can be shown as a difference in the return to exports as well as the difference in the country characteristics.



(a) All AGOA: USA

(b) Always AGOA: USA

(c) EBA & AGOA: USA

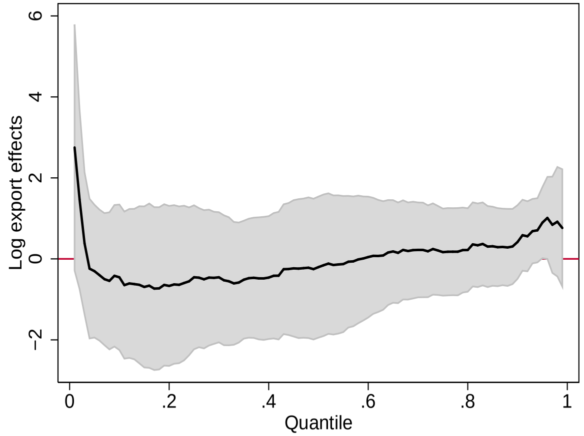
(d) In & Out: USA

(e) All AGOA: USA/EU

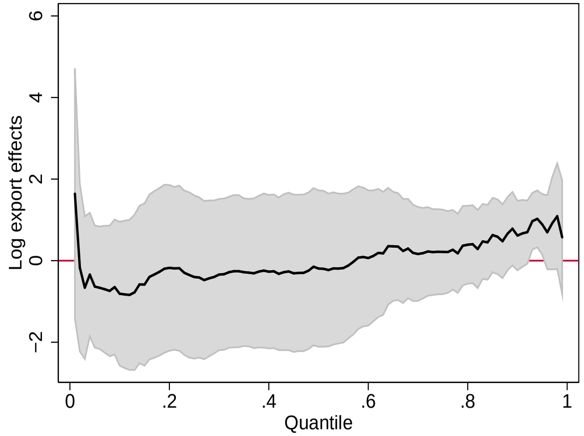
(f) EBA & AGOA: USA/EU

Decomposition based on the estimation of 99 quantiles with a 100 bootstrapped replications for the standard error. Covariates used in the decomposition include area, gross domestic product, landlocked, and distance. Total change refers to the raw export gap between AGOA and non-AGOA countries. Covariates is the difference due to the covariates and coefficients is the difference due to the coefficients estimated. Results are based on the matched sample of countries and the covariates used in the tables above are included. A horizontal line at zero is added to show the positive and negative changes more clearly.

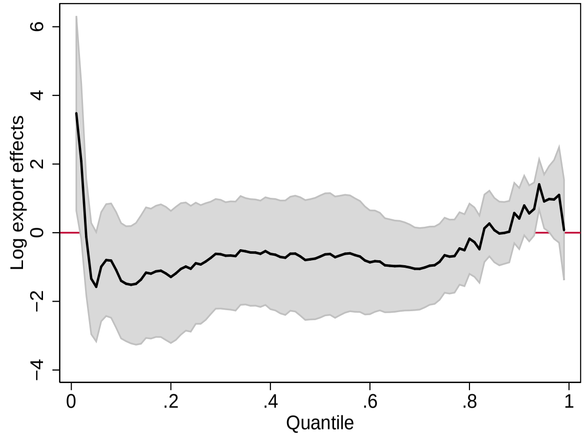
Figure 5.10: *Decomposition of differences in the distribution of exports*



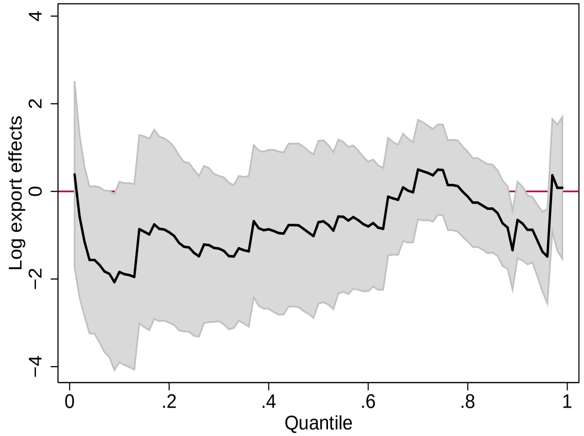
(a) All AGOA: USA



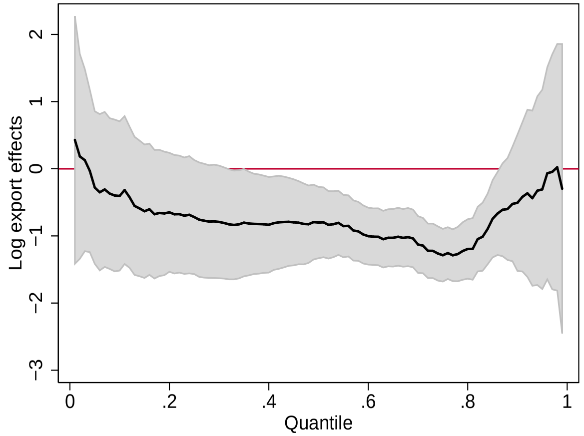
(b) Always AGOA: USA



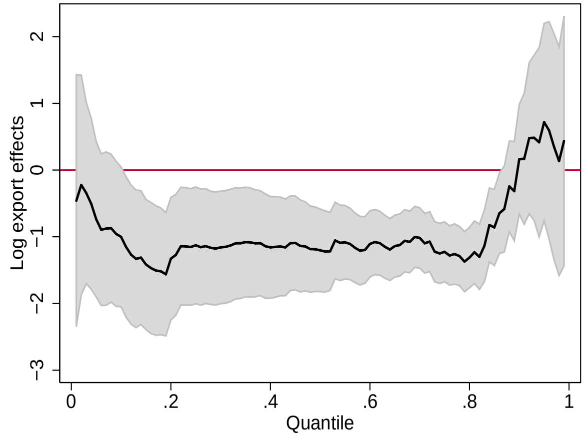
(c) EBA & AGOA: USA



(d) In & Out: USA



(e) All AGOA: USA/EU



(f) EBA & AGOA: USA/EU

The graphs shown are based on the estimation of 99 quantiles with a 100 bootstrapped replications for standard errors. The continuous dark line is the effect of the coefficient and the grey line enclosing the effect is the 95% confidence interval. Results are based on the matched sample of countries and the covariates used in the tables above are included. A horizontal line at zero is added to show the positive and negative changes more clearly.

Figure 5.11: *Effect of estimated coefficients on export difference*

5.4.4 Panel data analysis

The estimates reported in this section are for our panel quantile regressions. In this section, we do not carry out a decomposition analysis mainly because the methods discussed in section (5.4.3) are based on cross-section data. It is not entirely impossible to perform the decomposition exercise on the panel data, however it is more complex and might not yield stable values of the effects. We find more significant results in this section compared to the previous section. The additional variation obtained by having a time dimension has significantly improved the results. Furthermore, we include dummies for each year to capture changes in demand and also changes in the AGOA preferences over time in all columns. The time averages of the time varying variables are also included to capture elements of the fixed effects regression in all columns.

Table (5.10) reports estimates for the level of total exports to the USA, the USA/EU and USA/ROW export ratios. The first four columns of estimates are for total exports to the USA, the next four are the USA/EU export ratio and the last four are the USA/ROW export ratio. The countries simultaneously enjoying EBA and AGOA preferences report no significant coefficients. Countries always in AGOA report significant and positive estimates at the 75th and 95th quantiles but a negative and significant estimate at the median. While a positive and significant coefficient is observed for all AGOA beneficiaries at the 95th quantile. The significant estimates for countries in and out of AGOA is negative and significant at the 95th quantile. Exploring these estimates points to the fact that, the gains in total exports to the USA is mainly found at the top half of the export distribution. For instance in column (1) the estimate of 0.554 translates into 74% higher exports for the treated relative to the control countries at the 95th quantile. On the contrary, the countries moving in and out of AGOA experience a 65% decline relative to the control countries at the 95th quantile, all things equal. In terms of the countries always in AGOA, the impact turns out to be 85.7% higher exports relative to the control countries at the 95th quantile. For this same group of treated countries, they have 84.2% higher exports relative to the controls at the 75th quantile but at the median—the median exporters have 33.4% less exports than the control countries, all things equal.

Moving on to the USA/EU export ratio we observe more significant coefficients although there is only one significant and negative coefficient estimate at the 95th quantile for countries that have moved in and out of AGOA. All the significant coefficients are negative indicating that all things equal, the treated countries have a relatively smaller export ratio compared to the control countries. One interpretation of this result is that at the 75th and lower quantiles, the treated countries export less to the USA relative to the exports to the EU when this is compared with that of the control countries. The coefficient indicates that the relative difference in the ratio is 0.533 to 1.662 points less exports for the treated compared to the control countries at the significant quantiles, all things equal. In other words, the treated countries have relatively higher exports to the EU compared to the control countries at each quantile of the export distribution. This result tends to point towards the relative ease with which AGOA countries have had access to the EU market compared to other countries. One must bear in mind also that, the African countries are much closer to the EU in terms of distance, compared to some of the Asian and Southern American countries that are part of the control group of countries. Nevertheless, for most of the AGOA countries there have been historical ties with either France or Great Britain and they have English or French as their national language—making it easier to trade with the EU[16].

The results for the USA/ROW export ratio shows that, there are positive and significant coefficients at the 25th quantile (column 10), median (columns 9–11) and the 75th quantile (columns 9, 11–12). The positive coefficients indicate that the treated countries have a higher USA to ROW ratio of exports relative to the control countries, all things equal. The mean share in the dataset of USA exports in total exports of all AGOA countries is 13.0% for the 10 years. This increases to 15.3% for countries that have maintained their preferential status over the period. The range of the shares however, vary from almost zero percent in some years to approximately 96% in other years. This can be compared to the mean shares for the EU of 40.4% and 41.2% over the period for all AGOA and always AGOA countries respectively. It is therefore not surprising that compared to the EU the ratio of export coefficients indicate a lower volume of exports to the USA relative to the EU. To the contrary, this is reversed when exports to the USA is compared to exports to the rest of the world. Returning to the table, the coefficients estimated imply that, the USA/ROW export ratio is 0.69 to 0.93 points higher compared to the control countries, all things equal. Again, the largest estimates as was in the previous two cases is centred around the median and the 75th quantiles. The results so far indicate that much of the difference in the distribution of exports between the treated and control countries can be consistently found at the median and 75th quantiles. Although, in a few cases this has been at the 25th quantile and the 95th quantile.

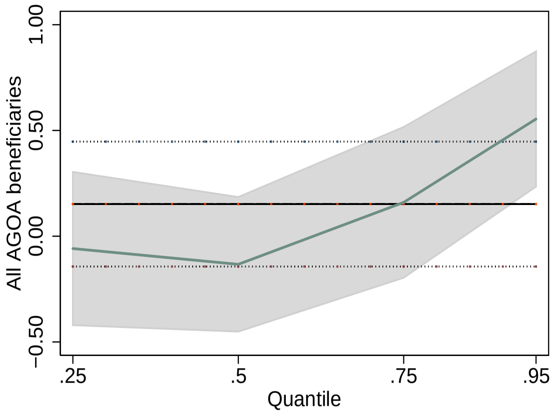
Figure (5.12) provides selected graphs of the quantile estimates for table (5.10). The diagrams showing the quantile estimates beyond the OLS limits are figures 5.12(b), 5.12(c), 5.12(e) and 5.12(f). Additionally, the quantile estimates for the figures mentioned do show some variation across the quantiles. We can safely conclude that, at least one of these quantile coefficients is significantly different from the other quantiles—thus for example, in a number of cases the 95th quantile estimate is statistically different from the remaining coefficients. The same can be said of the median and 75th quantile coefficients which in some cases are below the lower limit of the OLS confidence interval while the 95th quantile coefficient is above the upper confidence limit. However, figure 5.12(a) is a borderline case—the 95th quantile estimates are beyond the OLS confidence limits but the remaining quantiles are well within the OLS confidence interval. We carry out a similar analysis with the eight product groups defined earlier and this is discussed next.

[16]There are exceptions to this, a few Portuguese and Spanish speaking countries in Africa have had historical ties with Portugal and Spain. These include countries such as Angola, Cape Verde and Mozambique

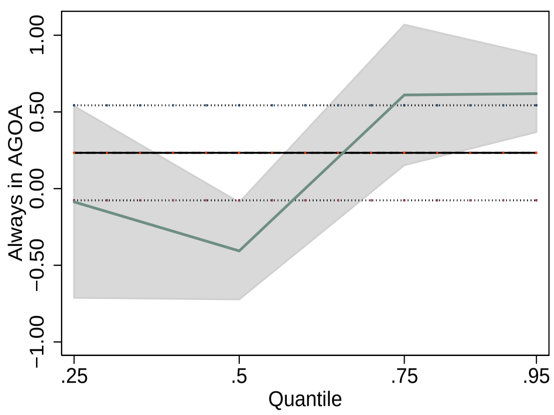
Table 5.10: Quantile regression estimates for exports to the USA

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Total exports to USA				USA/EU export ratio				USA/ROW export ratio			
	All	IN & OUT	Always	EBA & AGOA	All	IN & OUT	Always	EBA & AGOA	All	IN & OUT	Always	EBA & AGOA
q25												
All AGOA	-0.0583				-0.548***				0.183			
	(0.275)				(0.146)				(0.189)			
In & Out		-0.969				-0.224				0.761*		
		(0.574)				(0.440)				(0.331)		
Always in AGOA			-0.0867				-0.533***				0.275	
			(0.297)				(0.159)				(0.189)	
EBA & AGOA				-0.497				-0.685**				-0.276
				(0.305)				(0.251)				(0.234)
Constant	-39.74***	-40.31***	-32.76***	-22.21***	-27.21***	-42.32***	-22.31***	-30.60***	-24.82***	-27.25***	-13.47*	-9.774*
	(4.811)	(9.188)	(5.350)	(5.720)	(5.188)	(8.843)	(4.395)	(7.392)	(5.507)	(7.218)	(5.319)	(4.685)
q50												
All AGOA	-0.133				-0.770***				0.771***			
	(0.181)				(0.187)				(0.173)			
In & Out		-0.613				-1.081***				0.871**		
		(0.557)				(0.274)				(0.322)		
Always in AGOA			-0.406*				-0.714***				0.740***	
			(0.197)				(0.193)				(0.178)	
EBA & AGOA				-1.284***				-1.131***				-0.0468
				(0.238)				(0.214)				(0.201)
Constant	-38.16***	-30.22***	-29.58***	-28.57***	-18.89***	-9.783	-15.82***	-15.26***	-18.27**	-28.81***	-5.542	2.134
	(4.995)	(7.592)	(4.737)	(5.619)	(3.267)	(5.164)	(3.789)	(4.036)	(5.741)	(6.731)	(5.926)	(5.789)
q75												
All AGOA	0.160				-1.217***				0.689***			
	(0.246)				(0.246)				(0.178)			
In & Out		-0.537				-1.662***				-0.233		
		(0.381)				(0.225)				(0.407)		
Always in AGOA			0.611*				-0.749*				0.926***	
			(0.270)				(0.351)				(0.167)	
EBA & AGOA				-0.443				-1.472***				0.793**
				(0.565)				(0.349)				(0.262)
Constant	-21.10***	-18.05***	-22.19***	-30.77***	-11.16***	-3.887	-6.233	-4.025	-13.37***	-19.40***	-1.827	-2.135
	(5.359)	(3.155)	(6.331)	(7.650)	(2.642)	(3.646)	(6.420)	(3.380)	(4.014)	(5.270)	(4.772)	(5.583)
q95												
All AGOA	0.554***				0.110				-0.0635			
	(0.157)				(0.291)				(0.310)			
In & Out		-1.060***				-2.658***				-0.442		
		(0.275)				(0.459)				(0.386)		
Always in AGOA			0.619***				0.194				0.235	
			(0.155)				(0.245)				(0.348)	
EBA & AGOA				0.228				0.770				0.818
				(0.375)				(0.505)				(0.757)
Constant	-22.27***	-11.50*	-18.03**	-21.16**	16.09	16.68**	17.60**	22.80*	-7.817	-9.879*	-8.708	-13.29
	(4.500)	(4.587)	(5.650)	(6.445)	(8.952)	(5.273)	(5.806)	(8.853)	(5.013)	(4.623)	(5.150)	(9.228)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	744	405	614	494	744	405	614	494	744	405	614	494

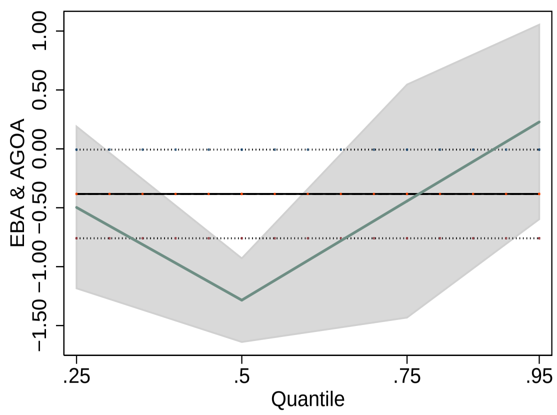
Bootstrapped standard errors with 500 replications in parenthesis. Dependent variable is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. First four columns are for exports to the USA, second four columns are for USA/EU and last four columns are USA/ROW export ratios $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$



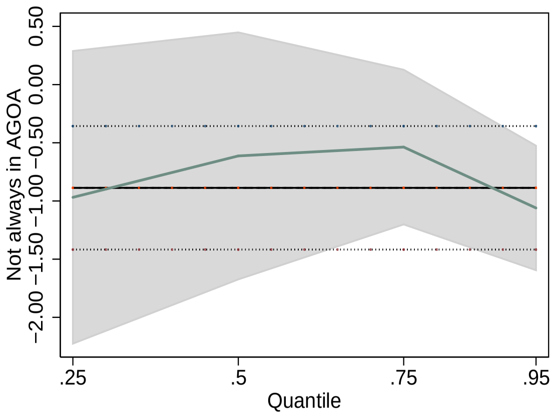
(a) All AGOA: USA



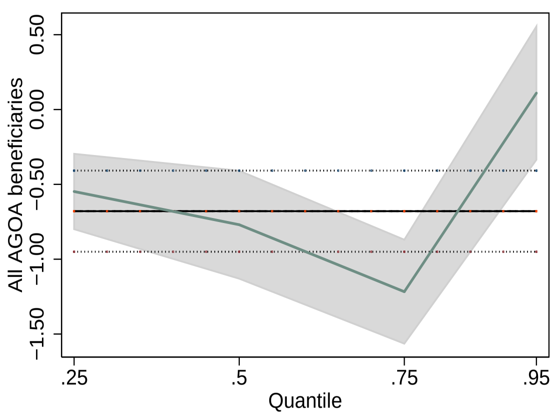
(b) Always AGOA: USA



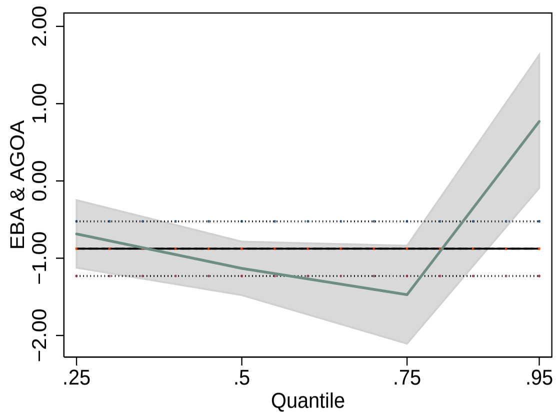
(c) EBA & AGOA: USA



(d) In & Out: USA



(e) All AGOA: USA/EU



(f) EBA & AGOA: USA/EU

Figure 5.12: *Estimated quantiles with confidence intervals: (Panel) based on Table 5.10*

5.4.5 Result for product analysis

In this section we analyse the results for eight product categories: (a) TALF (b) AMDS (c) FBWTP (d) EI (e) CPR (f) ISOM (g) METE and (h) OI export clusters. The four treated categories are maintained in the analysis below. These continue to be the following treatment groups: (a) In & Out (b) All AGOA (c) EBA & AGOA and (d) Always AGOA. The analysis here focusses on total exports of these products to the USA and the USA/EU export ratios for each product. In the appendix (appendix D) additional results for all countries and further product analyses are shown. At the end of this section we also present graphs of the quantile coefficients for three of the treated groups, namely, all AGOA, EBA & AGOA and always AGOA thereby providing us with six separate figures exploring the quantile estimates in detail. The remaining figures for the in and out of AGOA group can be found in the appendix.

Tables (5.11)–(5.14) present the results for total exports of each product group to the USA. The countries that move in and out of AGOA (in table 5.11) tend to export more FBTWP (25th, 50th and 95th quantiles), CPR (25th quantile), ISOM (95th quantile), METE (25th quantile) and OI (75th quantile) than the control countries, all things equal. On the contrary, they export less TALF (75th and 95th quantiles), AMDS (95th quantile) and CPR (95th quantile) than the control countries, all things equal. The positive coefficients are a bit puzzling at first, however, the composition of these countries include, Mauritania and Côte d'Ivoire whose exports were quite high in the years they had their AGOA status. A number of the countries have only been out of the programme during the sample for about a year or two. This makes the coefficients less puzzling and probably indicates the importance of the preference for some of these countries. The reinstatement of a number of the countries points to how quickly they resolve their internal conflicts and political stalemates in order to be accepted back into the AGOA programme. Nonetheless, this group of countries are not major exporters of textile products hence they have approximately 98.8% and 98.6% less TALF exports compared to the control countries at the 75th and 95th quantiles, all things equal. For agricultural products this gap is -87.97%, while it is -62.95% for CPR products, all at the 95th quantile, all things equal. There are no significant estimates for extractive industry exports indicating no significant difference between the control countries and the treated countries. The FBTWP exports is 15.4, 6.3 and 16.98 times higher than the exports of the control countries at the 25th, 50th and 95th quantiles, all things equal. For CPR, ISOM, METE and OI products these are 16, 27.6, 4.4 and 1.9 times the exports of the control countries, all things equal.

The next table, table (5.12) provides the results for all countries having the AGOA preference. This time, TALF and OI exports are significant and negative at all four quantiles estimated. Exports of AMDS and CPR products are significant and negative at the 95th quantile while ISOM products are significant and negative at the 25th quantile. Meanwhile, METE exports are significant and negative at the 50th, 75th and 95th quantiles. A few significant and positive coefficients are recorded for FBWTP at the 25th and 95th quantiles as well as EI products at the 75th and 95th quantiles. The EI (extractive industry) products are mainly concentrated at the top of the distribution. This bodes well with the composition of countries exporting EI products which includes crude oil. The major crude oil players such as Nigeria, Angola and Gabon tend to be among the top African oil exporting nations. The EI sector also includes South Africa and Congo (Republic of) that are also among the top five exporting nations to the USA. The positive coefficients at these two quantiles are therefore more in line with our expectations. The results indicate that, the countries at the 75th and 95th quantiles export 3.4 and 14.3 times the exports of the control countries holding all regressors constant. In terms of FBTWP exports, these are 2.3 and 3.4 times the exports of the control countries at the 25th and 95th quantiles. This impact is much smaller than that of the EI products indicating the importance of the extractive industry products in the exports of the AGOA countries. The OI product exports for the treated are 49.4% to 58.4% less than that of the control countries, all things equal. Furthermore, the TALF product exports for the treated are 77.1% to 96.4% less than the control countries—the lowest and highest quantile coefficient estimates. This is an indication that, the AGOA countries in spite of the very favourable textile and apparel preferences are less competitive than the control countries. The remaining products show a relative lower exports of 55.9% to 85.4% compared to the control countries, all things equal.

All coefficients estimated for OI and CPR products are negative and significant at all four quantiles in table (5.13). AMDS products are significant and positive at the 25th and 50th quantiles while EI and ISOM exports are significant at the 95th quantile. The remaining products, TALF and METE yield significant and negative coefficient estimates for three out of the four quantiles estimated while EI has negative and significant coefficient estimates at the 25th and 50th quantiles as well as ISOM at the 25th quantile. The negative coefficient estimates indicate that the exports of the products by the treated countries were less than that of the control countries. We might attribute the competing EBA preferences to these results. For instance, the countries at the 25th and 50th quantiles are probably more competitive in exporting extractive industry products to the EU rather than the USA. On the contrary, the treated countries at the 95th quantile exporting EI products are relatively more competitive compared to the control countries in the USA market. The coefficient indicates that, the treated countries at the 95th quantile export 9.5 times the EI exports of the control countries all things equal. However, the EI exports at the 25th and 50th quantiles indicate exports are 96.5% and 89.9% less than the control countries. The countries at the 25th and 50th quantiles are relatively more competitive at exporting AMDS products to the USA. The coefficients imply relatively higher exports of 248% to 250% compared to the control countries for AMDS products, all things equal. The TALF exports are 83.8%, 86.4% and 90.3% less than the control countries at the 25th, 50th and 75th quantiles respectively holding all variables constant. Similarly, the relative decline of ISOM products is 79.4% at the 25th quantile while METE exports indicate a relative gap of -70.3% (50th quantile) to -80.8% (95th quantile). The range of the relative gap is -71.3% – (-)85.4% and -71.8% – (-)86.5% for CPR and ISOM exports respectively for the lowest and highest coefficients estimated.

In table (5.14) results are shown for countries that have maintained their AGOA status throughout the period of analysis. There are a few differences in the results presented in this table and table (5.12). The exclusion of countries that move in and out of AGOA, has probably led to changes in the composition of treated and control countries in the tails of the distribution of the various product exports. These changes are clearer in certain products such as AMDS, FBTWP, CPR and ISOM. On the contrary, TALF, EI, METE and OI exports report coefficients that have similar signs and significance to table (5.12). The differences observed for these products are marginal and mostly in terms of the magnitude of the coefficients. In terms of the products, we notice changes in the significance of the coefficients. For instance, AMDS is additionally significant at the 25th quantile while FBTWP is no longer significant at the 25th quantile and 95th quantile in our comparator table but is now significant at the 25th quantile. Similarly, CPR is now significant at the 25th and 50th quantiles as well as ISOM which reports a significant coefficient at the 75th quantile. Even with these changes, the signs of the coefficients of the significant estimates in the comparator table are maintained—a reason why we attribute these changes to the tails of the new distribution of product exports. In terms of the relative gaps between the treated and control country product exports, the gap at the 75th and 95th quantiles for EI exports roughly indicate that, exports of the treated are 19 and 13 times the exports of the control countries respectively, holding all else constant. This again consistently supports the fact that the extractive industry and particularly crude oil and petroleum product exports significantly drive the gains in the top AGOA countries. Given that these gains are driven at the top by these countries leads us to believe that, the gains from AGOA are not fairly distributed across the recipient countries. The gains are much higher for countries at the top of the distribution compared to countries at the median and 25th quantiles. The impact at the median for FBTWP exports is much smaller and indicates that approximately 1.8 times the exports of the control countries are exported by the treated countries due to the AGOA preference, all things equal. In percentage terms this is equivalent to 87.4% higher exports for the treated countries relative to the control countries at the median.

The TALF coefficients are equivalent to relative gaps of -85.5%, -83%, -93.3% and -97.6% at the 25th, 50th, 75th and 95th quantiles respectively, all things equal. Other industry (OI) products are also equivalent to the following relative gaps of -71.97%, -59.4%, -75.8% and -71.6% at the 25th, 50th, 75th and 95th quantiles respectively and all things equal. While the effects at the upper end of the TALF distribution is greater in magnitude implying larger losses at the top of the distribution, the biggest losses are at the 75th quantile for OI products. The remaining negative and significant coefficient estimates imply (a) a 55.3% and 62.2% lower export value for the treated relative to the controls for AMDS exports at the 25th and 95th quantiles; (b) 57.5% and 55.5% less exports relative to the control countries for CPR exports at the 25th and 50th quantiles; and (c) 62.2%, 68.8% and 78.4% less exports relative to the control at the 50th, 75th and 95th quantiles and holding all variables constant. These remaining products show that the treated countries are less competitive at the tails of the distribution. For AMDS exports this is found at both ends of the distribution, CPR exports are at the left tail while METE exports are at the median and right half of the product export distribution. Our assertion in the previous paragraph that EI exports tend to be driving the gains in AGOA finds support in the results presented here. Thus, apart from AMDS (in table 5.13), FBWTP (in tables 5.11, 5.12 and 5.14) and EI (in tables 5.12–5.14) exports, the remaining products point to lower exports relative to the controls at some of the specific quantiles of interest. Thus, we can attribute the increases in these product exports compared to the control countries to the AGOA status of the African countries.

Figures (5.13) – (5.15) provide the supporting diagrams[17] of the estimated quantiles in tables (5.11)–(5.14). In figure (5.13) the only figure showing no potential differences among the estimated quantiles is panel (h) for OI exports—the plot of quantile coefficients all lie well within the OLS confidence limits. The next graph (figure 5.14) shows that panels (d), (e) and (g) all lie within the OLS confidence limits. On the contrary, the remaining panels show portions of the quantile

[17]The two remaining diagrams for the In & Out treatment group is provided in the appendix.

distribution lying beyond the OLS confidence limits. Thereby indicating that these coefficients are not necessarily equal. Thus, the effects at the various quantiles (mostly the tails) of the distribution differ greatly. In figure (5.15), panel (d) and to some extent (b) lie within the OLS confidence limits. The remaining figures show parts of the distribution of quantile coefficients lying beyond the OLS confidence limits. This summary of the coefficients described above (and shown in the figures below) goes a long way to provide support to our assertion that, the impact of AGOA is heterogeneous for the recipient countries. In all almost all cases, the magnitude of the impact at the 95th quantile is the largest and this is more pronounced for EI exports where the largest gains are observed at the topmost quantile estimated.

Table 5.11: Quantile regression estimates for exports to the USA

	(1) TALF	(2) AMDS	(3) FBTWP	(4) EI	(5) CPR	(6) ISOM	(7) METE	(8) OI
q25								
In & Out	-0.130	0.192	2.737***	0.875	2.775**	-0.490	1.484*	0.561
	(1.450)	(0.565)	(0.655)	(0.804)	(0.932)	(0.880)	(0.646)	(0.622)
Constant	-81.60**	-57.82***	-58.44***	-9.430	-54.44***	-18.10	-8.478	-29.98**
	(29.524)	(9.678)	(11.173)	(11.389)	(7.488)	(16.707)	(10.522)	(9.911)
q50								
In & Out	-1.649	-0.203	1.989**	0.526	0.753	-1.500	0.169	0.116
	(0.981)	(0.596)	(0.607)	(0.640)	(0.700)	(0.765)	(0.380)	(0.266)
Constant	-70.18**	-39.96***	-29.63***	3.751	-53.57***	-8.004	-1.530	-32.65***
	(22.275)	(11.395)	(7.494)	(7.300)	(5.281)	(12.540)	(8.606)	(5.414)
q75								
In & Out	-4.428***	-0.857	0.956	-0.511	-0.699	-0.109	0.375	0.662**
	(1.032)	(0.531)	(0.904)	(0.413)	(0.509)	(1.366)	(0.396)	(0.249)
Constant	-67.21***	-36.59**	-38.87***	6.559	-47.18***	-19.52	-29.52**	-48.10***
	(14.480)	(11.142)	(7.429)	(4.787)	(6.162)	(15.322)	(9.932)	(4.150)
q95								
In & Out	-4.280***	-2.118***	2.832***	-0.425	-0.993**	3.316***	0.575	0.155
	(0.394)	(0.480)	(0.367)	(0.419)	(0.359)	(0.854)	(0.423)	(0.446)
Constant	-44.22***	-29.79***	-25.39***	14.12*	-20.46**	-32.28***	-53.52***	-50.42***
	(7.929)	(4.945)	(5.444)	(7.006)	(7.738)	(8.372)	(8.527)	(6.195)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	366	385	346	342	342	296	383	380

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.12: Quantile regression estimates for exports to the USA

	(1) TALF	(2) AMDS	(3) FBTWP	(4) EI	(5) CPR	(6) ISOM	(7) METE	(8) OI
q25								
All AGOA	-1.476***	0.0471	0.851*	-0.233	-0.542	-1.005**	-0.420	-0.853**
	(0.438)	(0.324)	(0.355)	(0.661)	(0.391)	(0.370)	(0.314)	(0.260)
Constant	-30.61*	-51.04***	-32.16***	-5.137	-27.74***	-1.699	-1.058	-9.420
	(13.256)	(4.859)	(7.438)	(10.904)	(7.410)	(8.769)	(6.121)	(6.120)
q50								
All AGOA	-1.959***	-0.148	0.411	0.189	-0.574	-0.596	-0.818**	-0.686***

	(0.403)	(0.307)	(0.235)	(0.479)	(0.371)	(0.426)	(0.267)	(0.186)
Constant	-42.88***	-42.61***	-24.59***	1.948	-40.99***	-18.32	3.596	-22.14***
	(6.928)	(5.735)	(4.045)	(7.295)	(6.404)	(10.078)	(5.638)	(3.053)
q75								
All AGOA	-3.318***	-0.0299	-0.575	1.227*	-0.537	0.910	-0.833**	-0.682**
	(0.601)	(0.206)	(0.433)	(0.485)	(0.276)	(0.547)	(0.298)	(0.228)
Constant	-61.10***	-43.19***	-31.09***	-8.672	-38.87***	-26.93*	3.424	-25.67***
	(9.239)	(5.385)	(3.707)	(6.284)	(5.003)	(11.565)	(5.645)	(3.776)
q95								
All AGOA	-2.343***	-0.922***	1.229*	2.659***	-1.927*	0.518	-1.413***	-0.878*
	(0.399)	(0.244)	(0.612)	(0.233)	(0.751)	(0.369)	(0.290)	(0.415)
Constant	-55.96***	-34.23***	-28.57***	7.641	2.210	-7.999	-3.154	-34.42***
	(7.812)	(4.169)	(5.091)	(9.168)	(20.452)	(5.708)	(8.321)	(6.237)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	675	675	623	613	611	521	694	692

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries.
$^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Table 5.13: Quantile regression estimates for exports to the USA

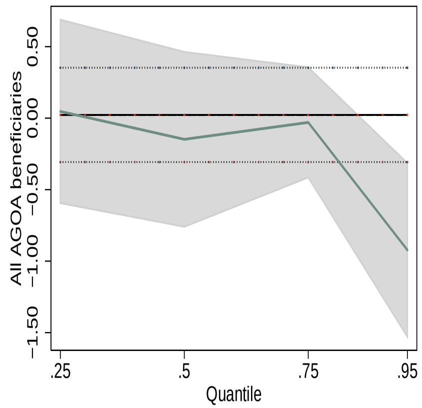
	(1) TALF	(2) AMDS	(3) FBTWP	(4) EI	(5) CPR	(6) ISOM	(7) METE	(8) OI
q25								
EBA & AGOA	-1.817**	0.918*	-0.393	-3.341***	-1.513***	-1.578**	-0.666	-1.927***
	(0.623)	(0.386)	(0.420)	(0.600)	(0.443)	(0.554)	(0.398)	(0.274)
Constant	-32.43	-69.60***	-28.40***	14.80	-18.14	23.87	0.742	-5.857
	(22.746)	(5.136)	(7.843)	(10.249)	(10.420)	(15.931)	(8.528)	(7.542)
q50								
EBA & AGOA	-1.998***	0.911**	-0.209	-2.292**	-1.877***	-0.270	-1.214***	-1.999***
	(0.544)	(0.348)	(0.321)	(0.765)	(0.396)	(0.675)	(0.268)	(0.258)
Constant	-38.40***	-47.05***	-17.75*	7.485	-17.86	-8.094	8.107	-11.60*
	(10.491)	(6.436)	(7.339)	(9.803)	(9.815)	(10.386)	(9.195)	(4.901)
q75								
EBA & AGOA	-2.328*	0.0240	-0.905	0.0403	-1.247*	0.752	-1.581***	-1.927***
	(1.041)	(0.385)	(0.476)	(1.095)	(0.527)	(0.754)	(0.283)	(0.413)
Constant	-32.11**	-28.44***	-30.71***	6.853	-39.13***	-23.52*	7.137	-15.37*
	(11.343)	(8.232)	(5.847)	(7.080)	(6.872)	(11.163)	(7.299)	(6.359)
q95								
EBA & AGOA	-2.103	0.472	0.412	2.248***	-1.924***	1.051*	-1.650*	-1.256*
	(1.269)	(0.867)	(0.287)	(0.339)	(0.534)	(0.465)	(0.725)	(0.543)
Constant	-51.14***	-35.75***	-30.70***	3.377	-22.21*	-24.65***	-37.27*	-29.04***
	(11.570)	(7.196)	(3.868)	(5.261)	(8.928)	(7.386)	(14.619)	(7.693)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	447	440	413	394	397	338	465	463

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries.
$^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

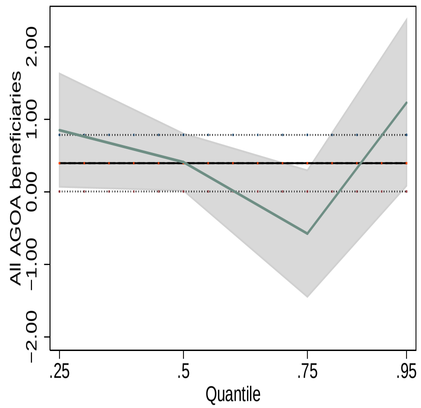
Table 5.14: Quantile regression estimates for exports to the USA

	(1) TALF	(2) AMDS	(3) FBTWP	(4) EI	(5) CPR	(6) ISOM	(7) METE	(8) OI
q25								
Always in AGOA	-1.928***	-0.804*	-0.0105	-0.828	-0.856*	-0.926	-0.321	-1.272***
	(0.437)	(0.407)	(0.364)	(0.690)	(0.391)	(0.498)	(0.302)	(0.278)
Constant	-75.42**	-57.99***	-27.48***	-0.944	-27.66***	3.836	-14.46*	-23.43**
	(24.617)	(5.578)	(7.292)	(14.700)	(8.046)	(10.461)	(7.117)	(8.790)
q50								
Always in AGOA	-1.774***	-0.597	0.628*	0.972	-0.810*	-0.241	-0.974***	-0.901***
	(0.350)	(0.328)	(0.252)	(0.547)	(0.371)	(0.494)	(0.267)	(0.242)
Constant	-43.59***	-40.58***	-25.75***	5.678	-41.04***	-13.73	-17.43*	-24.28***
	(7.393)	(5.596)	(5.681)	(7.507)	(7.991)	(9.467)	(6.918)	(3.612)
q75								
Always in AGOA	-2.706***	-0.480	-0.346	2.947***	-0.357	1.407*	-1.163***	-1.418***
	(0.666)	(0.258)	(0.486)	(0.449)	(0.272)	(0.551)	(0.312)	(0.278)
Constant	-37.42***	-29.47***	-31.50***	2.012	-49.54***	-27.92*	-4.612	-24.30***
	(10.007)	(6.104)	(4.837)	(6.159)	(4.814)	(12.477)	(7.793)	(4.261)
q95								
Always in AGOA	-3.740***	-0.974***	0.205	2.571***	-0.550	0.833	-1.530***	-1.257***
	(0.555)	(0.265)	(0.183)	(0.207)	(0.347)	(0.513)	(0.365)	(0.363)
Constant	-32.80***	-33.64***	-29.44***	18.33**	-47.83***	-12.59	-10.26	-28.62***
	(7.240)	(7.217)	(4.121)	(6.753)	(4.292)	(6.420)	(10.104)	(6.386)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	564	550	526	510	510	445	584	583

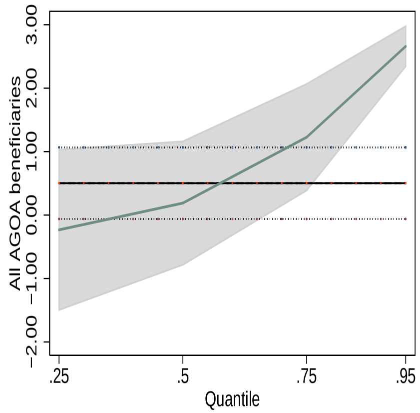
Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$



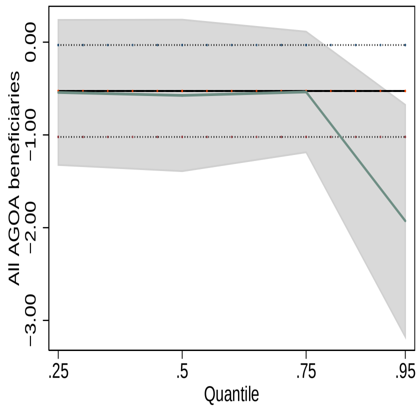
(a) AMDS



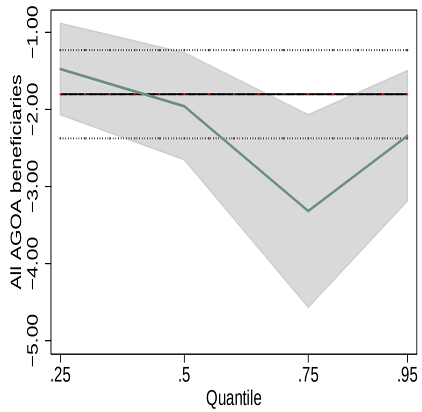
(b) FBTWP



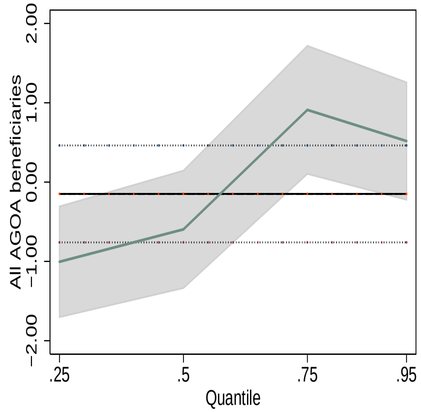
(c) EI



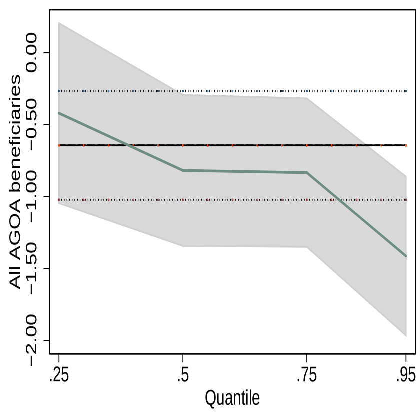
(d) CPR



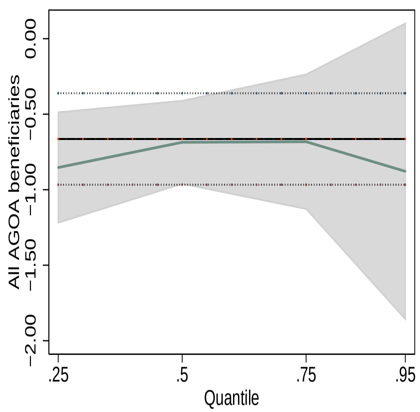
(e) TALF



(f) ISOM



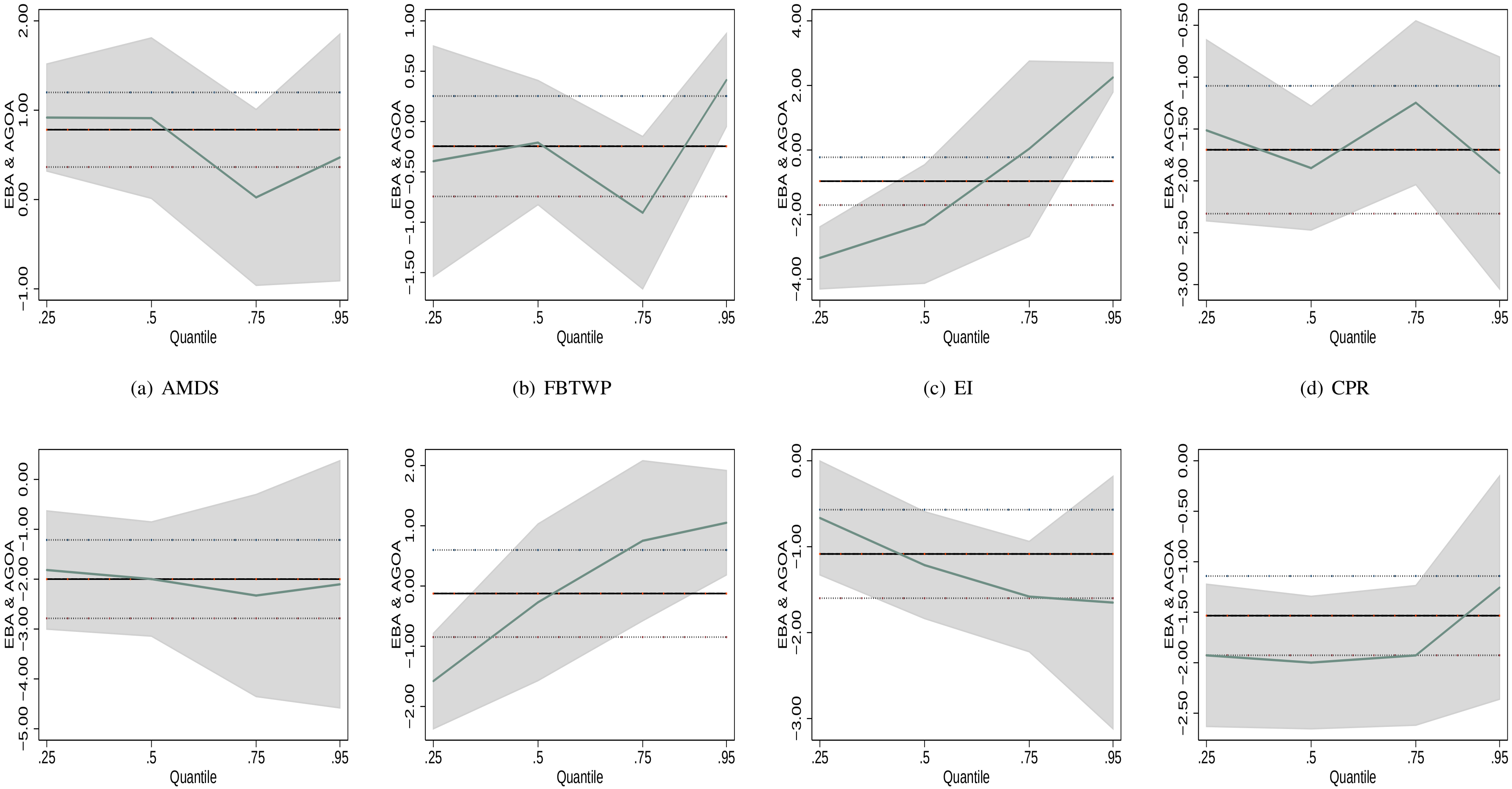
(g) METE



(h) OI

Controls include: English, Spanish & landlocked dummies, logs of distance, area & gdp and Mundlak terms & year dummies. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Figure 5.13: *Estimated quantiles with confidence intervals: (Panel) based on all countries provided with AGOA, Table 5.12.*

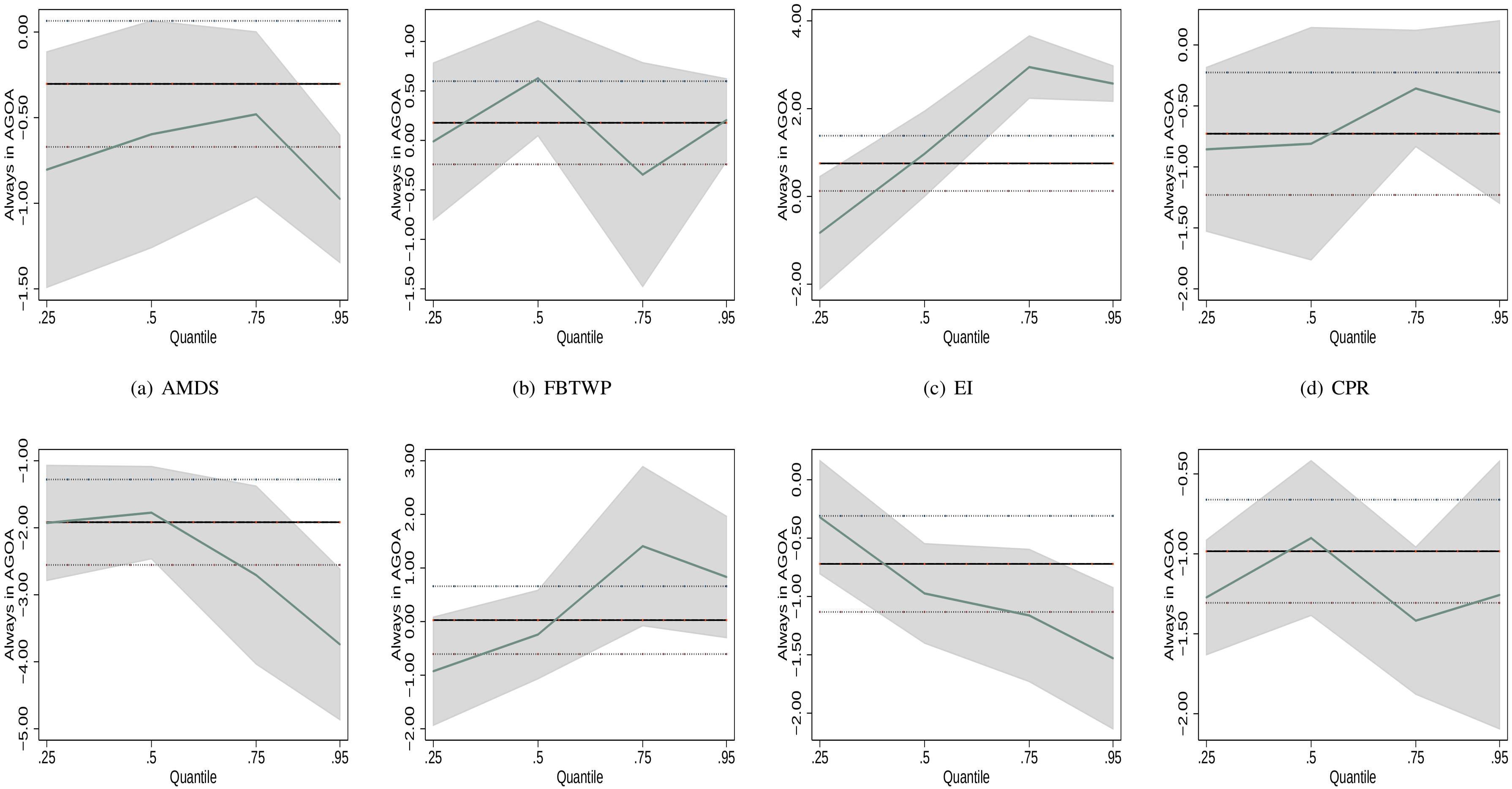


(a) AMDS (b) FBTWP (c) EI (d) CPR

(e) TALF (f) ISOM (g) METE (h) OI

Controls include: English, Spanish & landlocked dummies, logs of distance, area & gdp and Mundlak terms & year dummies. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Figure 5.14: *Estimated quantiles with confidence intervals: (Panel) based on countries having both EBA & AGOA preferences, Table 5.13*



(a) AMDS (b) FBTWP (c) EI (d) CPR

(e) TALF (f) ISOM (g) METE (h) OI

Controls include: English, Spanish & landlocked dummies, logs of distance, area & gdp and Mundlak terms & year dummies. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Figure 5.15: *Estimated quantiles with confidence intervals: (Panel) based on countries always in AGOA, Table 5.14*

We now turn our attention to the final four tables (tables 5.15–5.18) presented in this section. The dependent variable is now the USA to EU export ratio for each of the product groups analysed. In table (5.15) none of the quantile coefficients are significant for OI products. The only product having all quantile coefficients significant is AMDS exports. Apart from the 25th quantile estimate for METE products all the remaining significant coefficients are negative. The METE coefficient indicates that the USA/EU ratio of exports is higher for the treated countries relative to the control countries at the 25th quantile, all things equal. The implication of the positive impact is that this group of countries export more of the METE products to the USA relative to the EU when compared to the control countries. The estimate is consistent with the positive coefficient reported in table (5.11) where we considered the level of total exports to the USA. The negative coefficients for AMDS indicates that for the treated countries their USA/EU ratio of AMDS exports is lower relative to the control countries. The implication is that the treated countries export less of the product to the USA relative to the EU when compared to the control countries. This falls in line with our expectations given that, the countries in our treatment group are countries that have not consistently maintained their AGOA status. The magnitude of the impact is smaller at the 25th and 50th quantiles (-0.93 & -0.94) compared to the 75th and 95th quantiles (-2.1 & -2.8). Similarly, the coefficient at the 95th quantiles for FBTWP, CPR, TALF and ISOM are also negative. At the 75th quantile there are negative coefficient estimates reported for EI, CPR and TALF, while at the median the EI and ISOM coefficients are negative. On the whole, these countries are more consistent and competitive in the EU relative to the USA market.

In table (5.7) all significant estimates are negative indicating that, at the respective quantiles the treated countries have a lower export ratio relative to the control countries all things equal. In addition, AMDS, FBTWP and METE products have all four estimated quantiles significant at the 5% level of significance. For AMDS and FBTWP the magnitude of the impact increases as higher quantiles are estimated indicating that the relative difference is larger for the countries at the top half of the distribution. The coefficients at the 50th, 75th and 95th quantiles are significant for EI exports while CPR exports show significant estimates at the 75th quantile. Of the remaining products, TALF coefficients are significant at the 25th, 50th and 95th quantiles; ISOM and OI products record significance at the 25th and 50th quantiles. The AMDS coefficients are 1.1 to 3.2 points lower than the control countries. In summary, the remaining significant coefficients indicate that the export ratio is between 0.61 to 2.2 points lower than the control countries. The results here still point to the treated countries—in this case all AGOA countries being more competitive in the EU compared to the USA market. We note that majority of the countries within the treatment group enjoy at least one major preference of the EU. Thus, the coefficients indicating the higher exports to the EU relative to the USA market is probably capturing the effects of the competing preferences the EU has on offer for the AGOA beneficiaries. In the next table, we focus on those countries that receive the EBA preferences of the EU to see whether these differences are still observed.

As a matter of fact, we continue to have all significant coefficients remaining negative in table (5.17). However, fewer significant coefficients are observed compared to the previous table. The only product with all quantile coefficients significant is the METE product exports. The 25th quantile coefficient for AMDS and the 75th and 95th quantile estimates for FBTWP are no longer significant. The EI products are significant at the 50th and 75th quantiles while TALF products are significant at the 25th and 75th quantiles. The 25th, 50th and 75th quantile coefficient estimates for OI products are significant. The coefficient estimates do not vary widely across the two tables. Again, supporting our view that the competing preferences of the EU are playing a key role in making the EU more attractive for the AGOA countries. Nonetheless, we note as mentioned earlier in the chapter, that other forces such as distance to the EU market, common language and historical ties are playing an additional role here. More importantly one key aspect of the European preferences is that, the changes in the preferences as well as the countries are less frequent than the USA thereby providing more security for the African countries. It must be noted though, that one major competing preference which was enjoyed by the African countries—the EU-ACP preference was discontinued in 2008 although the EU safeguarded the entitlements of the African countries during a transition period towards the EU signing Economic Partnership Agreements (EPAs) with the respective African countries. We must also note that given that our data ends in 2010, the full effect of the EU-ACP withdrawal and transition to the EPAs is not fully captured. Hence, our results capture both the EU-ACP and EBA pro-competitive forces on the exporting capacity of the treated countries to the EU.

Finally, table (table 5.18) provides results for the countries that have had AGOA consistently over the sample period. Similar to table (5.16) all the quantile coefficients estimated at the four quantiles for AMDS and FBTWP are significant. The largest magnitude is observed at the 95th quantile for these two products. None of the remaining products report any significant estimates at the 95th quantile. Furthermore, none of the coefficients estimated for the CPR and ISOM products are significant. If it would be recalled, these two products were also not significant in the previous table. Again all significant estimates are negative and significant at the 5% level. The coefficients estimated at the 25th and 50th quantiles are significant for EI and OI products. The estimated coefficient at the 25th quantile is significant for TALF products while for METE products the significant coefficients are observed at the 25th, 50th and 75th quantiles. The AMDS coefficients indicate that, the export ratio is lower by 1.7, 1.9, 2.1 and 3.1 points relative to the control countries at the 25th, 50th, 75th and 95th quantiles respectively, all things equal. The magnitude for the FBWTP and remaining products are smaller compared to the AMDS products. The FBTWP products are 1.2, 1.1, 1.1 and 1.9 points less than the control countries at the 25th, 50th, 75th and 95th quantiles respectively, holding all other variables constant. Our remaining coefficients vary between 0.6 and 1.3 points less than the control countries, all things equal. Thus, confirming again that, the product exports to the EU are relatively higher than the USA compared to the control countries.

Figures (5.16)–(5.18) summarise the coefficients discussed above and shown in the tables below. In figure (5.16) apart from panels (f) and (g) (and to some extent panel [c]) all the remaining figures show significant departures from the OLS coefficient and the quantile estimates lie beyond the OLS confidence limits. Thereby indicating that for these coefficients, the quantile estimates are likely to be different. The next figure (5.17) shows fewer significant panels. The panels showing significant differences across the quantiles include (a), (d) and (g) (marginally moving beyond the lower confidence limit). Thus for the countries having both EBA and AGOA simultaneously, the difference in exports across the distribution is not statistically significant for most of the products. The final figure (5.18), also shows panels (c), (d), (e), (f) and (g) to lie within the OLS confidence limits. Panels (a) and (b) on the contrary show clearly that the quantile estimates are statistically significant given that the 95th quantile estimates are beyond the OLS confidence limits. Therefore in terms of the export ratio of the products the heterogeneity in the coefficient estimates are concentrated in a few products. This could imply that the exports of the treated countries to the EU may not necessarily be concentrated among a few countries and that all countries tend to enjoy almost equal access to the European market. Nonetheless, the ratio of exports tends to compress the distribution and reduces the outliers that were present in the respective exports in levels to the three destinations.

In concluding this section, we note that, a comparison of total exports to the USA provides a story of unequal benefits for the beneficiary countries. A comparison of their exports to the control countries, indicates that, much of the gains are centred at the top half of the export distribution. We also observe that, the AGOA countries tend to have more exports to the EU relative to the USA compared to the control countries. A number of reasons cited for this include the competing preferences of the EU, the distance, common language and the historical ties the African countries have with the EU. The product exports also provide some interesting heterogeneous impacts. The heterogeneous impacts are particularly more visible for extractive industry exports (EI). Nonetheless, some heterogeneity is visible in the remaining product exports. The products performing creditably well in the USA market are two groups, namely, the extractive industry and food, beverages, tobacco, wood and paper products. These two products seem to be behind much of the gains observed in the total exports to the USA. In one table agriculture, meat, dairy and seafood products does show some gains at the 25th and 50th quantiles. However, its significance is not maintained across the various tables of results as the previous two products mentioned. Comparatively, the EU has a wider spread of products that the African countries export to that market. This is observed in the negative estimates in the regressions involving the USA to EU product export ratio as the dependent variable.

Table 5.15: Quantile regression: USA/EU export ratio

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	AMDS	FBTWP	EI	CPR	TALF	ISOM	METE	OI
q25								
In & Out	-0.930**	0.797	-0.193	0.515	0.785	0.379	1.017*	0.298
	(0.356)	(0.437)	(0.587)	(0.758)	(0.697)	(0.859)	(0.502)	(0.518)
Constant	-50.87***	-15.53**	-19.52**	-55.96***	-80.16***	-68.34***	-5.967	-6.930
	(5.979)	(5.241)	(6.736)	(8.663)	(8.725)	(13.990)	(10.708)	(11.923)
q50								
In & Out	-0.938**	0.0412	-2.148***	-0.847	-1.229	-1.813**	0.249	0.366
	(0.359)	(0.318)	(0.456)	(0.493)	(0.711)	(0.671)	(0.372)	(0.341)
Constant	-42.42***	-8.349	-6.215	-39.39***	-44.80**	-19.10	-1.019	-4.869
	(7.785)	(5.388)	(6.820)	(7.016)	(15.156)	(12.449)	(8.087)	(6.854)
q75								
In & Out	-2.091***	-0.504	-2.164**	-2.633***	-2.564***	-1.229	-0.214	0.537
	(0.475)	(0.361)	(0.654)	(0.677)	(0.724)	(0.726)	(0.398)	(0.371)
Constant	-17.09*	1.391	10.20	-9.764	16.04	-1.757	10.26	-6.018
	(7.244)	(5.442)	(8.631)	(6.583)	(14.374)	(12.935)	(7.763)	(5.593)
q95								
In & Out	-2.752***	-2.491***	-1.715	-4.417***	-3.429***	-2.372***	-0.202	0.350
	(0.466)	(0.744)	(1.209)	(0.454)	(0.966)	(0.678)	(0.444)	(0.456)
Constant	-1.949	1.599	55.60***	25.42*	49.76***	8.894	-0.299	2.514
	(6.469)	(10.243)	(15.564)	(9.850)	(10.720)	(12.683)	(7.206)	(8.426)

Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	383	344	341	339	366	292	383	377

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variable is USA/EU export ratio. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries. $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Table 5.16: Quantile regression: USA/EU export ratio

	(1) AMDS	(2) FBTWP	(3) EI	(4) CPR	(5) TALF	(6) ISOM	(7) METE	(8) OI
q25								
All AGOA	-1.085**	-0.796***	-0.450	0.350	-1.053***	-0.839*	-0.735*	-0.536**
	(0.348)	(0.233)	(0.266)	(0.275)	(0.287)	(0.370)	(0.291)	(0.203)
Constant	-37.74***	-20.70***	-15.85**	-34.11***	-47.39***	-24.81*	-2.523	-4.370
	(5.271)	(4.246)	(5.294)	(6.473)	(9.247)	(10.190)	(6.606)	(4.819)
q50								
All AGOA	-1.572***	-0.955***	-1.068***	-0.471	-1.144*	-0.734*	-0.691**	-0.620***
	(0.185)	(0.172)	(0.258)	(0.309)	(0.481)	(0.352)	(0.214)	(0.177)
Constant	-28.08***	-13.76***	-7.280	-25.07***	-41.96***	-19.02*	-1.043	-4.587
	(5.069)	(3.244)	(4.544)	(4.130)	(8.112)	(8.543)	(5.106)	(3.526)
q75								
All AGOA	-2.027***	-0.980***	-0.611*	-0.989**	-1.102	-0.668	-0.739***	-0.191
	(0.284)	(0.253)	(0.252)	(0.338)	(0.632)	(0.347)	(0.196)	(0.181)
Constant	-18.76***	-6.186	10.08	-7.272	-34.39***	-6.890	1.853	-6.325
	(4.384)	(4.099)	(6.270)	(5.726)	(9.490)	(5.405)	(4.697)	(3.925)
q95								
All AGOA	-3.243***	-1.936***	-1.366*	-0.845	-2.170**	-1.113	-0.490*	-0.103
	(0.280)	(0.286)	(0.629)	(0.498)	(0.769)	(0.607)	(0.240)	(0.301)
Constant	3.779	-9.740	42.59**	0.214	-15.18	-0.643	7.997	3.240
	(4.883)	(7.016)	(14.070)	(7.416)	(9.108)	(8.032)	(4.561)	(7.135)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	673	621	612	608	675	517	694	689

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variable is USA/EU export ratio. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries. $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Table 5.17: Quantile regression: USA/EU export ratio

	(1) AMDS	(2) FBTWP	(3) EI	(4) CPR	(5) TALF	(6) ISOM	(7) METE	(8) OI
q25								
EBA & AGOA	-0.759	-1.092*	-0.839	-0.0403	-1.136*	-0.261	-0.918**	-0.897**
	(0.492)	(0.451)	(0.446)	(0.529)	(0.494)	(0.426)	(0.344)	(0.282)
Constant	-46.76***	-30.18***	-16.09*	-27.63**	-61.38***	-47.33***	-3.157	-22.14**
	(7.024)	(6.904)	(7.444)	(10.105)	(12.922)	(12.800)	(7.704)	(8.292)
q50								
EBA & AGOA	-1.091***	-0.955*	-1.237**	-0.138	-0.695	-0.489	-1.176***	-0.932***
	(0.282)	(0.386)	(0.401)	(0.525)	(0.543)	(0.466)	(0.270)	(0.213)

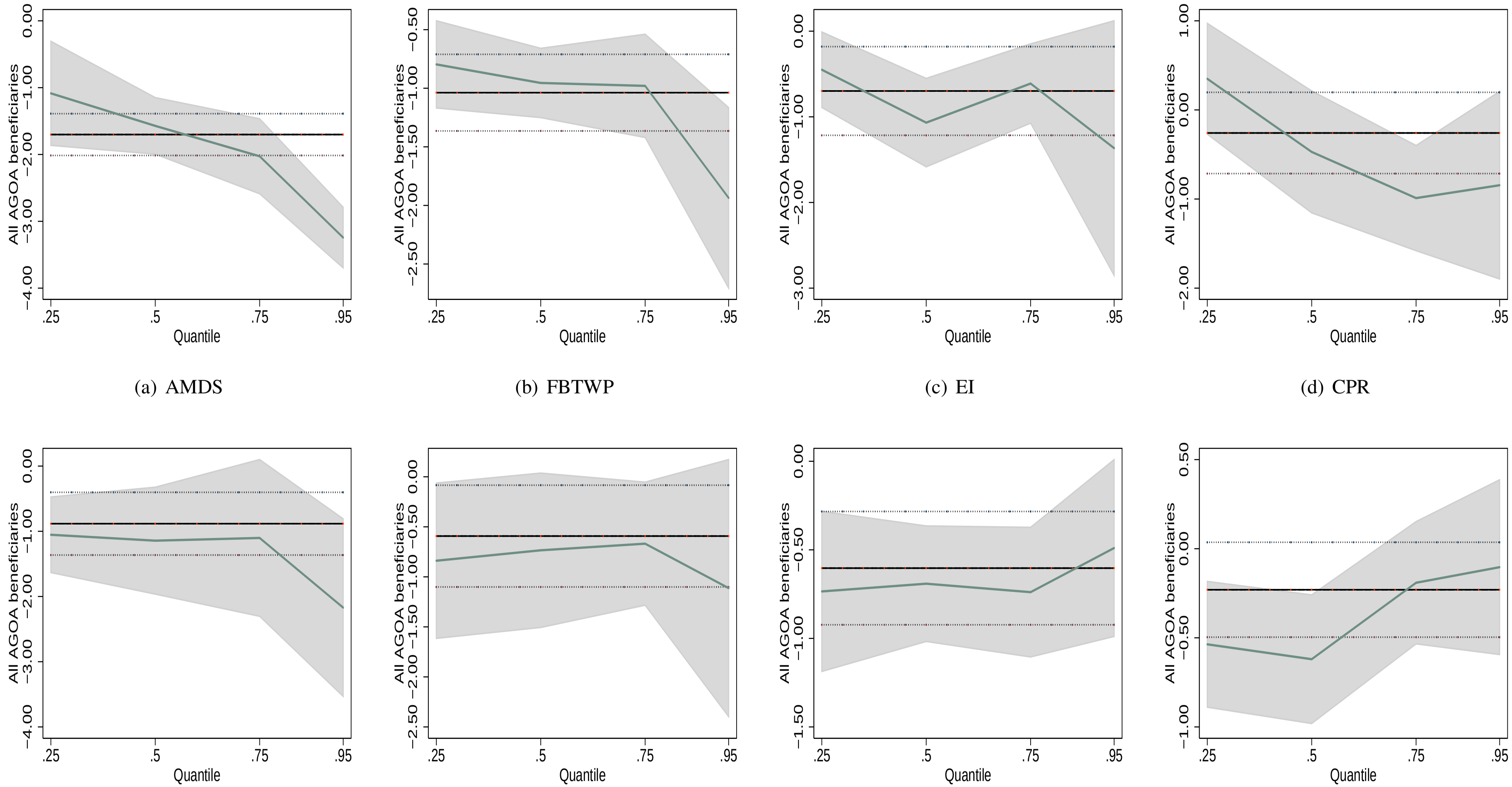
Constant	-29.04***	-17.50**	-20.35**	-16.75**	-25.13	-15.06	-1.289	-7.002
	(7.811)	(6.100)	(6.761)	(6.353)	(13.372)	(10.069)	(6.572)	(4.772)
q75								
EBA & AGOA	-1.584***	-0.470	-1.226**	0.151	-1.785*	-0.109	-1.278***	-0.783**
	(0.273)	(0.348)	(0.388)	(0.689)	(0.719)	(0.613)	(0.270)	(0.241)
Constant	-13.87**	-16.91**	-5.294	-11.53	-2.655	-12.03	5.667	-4.175
	(5.032)	(5.597)	(5.542)	(8.856)	(9.992)	(7.402)	(6.371)	(3.588)
q95								
EBA & AGOA	-3.378***	-1.031	-1.385	1.098	-1.101	-0.758	-1.492***	-0.345
	(0.805)	(0.877)	(1.011)	(0.833)	(0.731)	(0.927)	(0.365)	(0.556)
Constant	4.296	-16.28	13.12	-16.65	39.34*	5.986	15.07*	1.202
	(6.235)	(10.935)	(11.458)	(10.872)	(16.664)	(11.902)	(6.083)	(6.521)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	438	411	393	394	447	334	465	460

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variable is USA/EU export ratio. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries. $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Table 5.18: Quantile regression: USA/EU export ratio

	(1) AMDS	(2) FBTWP	(3) EI	(4) CPR	(5) TALF	(6) ISOM	(7) METE	(8) OI
q25								
Always in AGOA	-1.687***	-1.158***	-0.554*	0.488	-1.276***	-0.633	-0.605*	-0.699**
	(0.337)	(0.281)	(0.259)	(0.403)	(0.360)	(0.413)	(0.247)	(0.216)
Constant	-35.14***	-25.61***	-12.20*	-25.18**	-54.55***	-40.56**	-7.769	-9.082
	(6.267)	(6.463)	(5.959)	(7.831)	(11.748)	(13.086)	(6.068)	(6.795)
q50								
Always in AGOA	-1.879***	-1.047***	-0.972***	-0.000511	-0.553	-0.475	-0.836***	-0.702***
	(0.203)	(0.183)	(0.292)	(0.301)	(0.451)	(0.358)	(0.219)	(0.178)
Constant	-21.11***	-15.97***	-8.337	-22.54***	-20.72	-15.62	-6.812	-8.720*
	(5.572)	(3.966)	(6.057)	(5.041)	(10.688)	(9.077)	(5.039)	(3.792)
q75								
Always in AGOA	-2.049***	-1.103***	-0.427	-0.424	-0.605	-0.580	-0.884***	-0.309
	(0.243)	(0.256)	(0.257)	(0.313)	(0.652)	(0.415)	(0.214)	(0.190)
Constant	-9.708*	-14.53**	6.623	-9.094	-16.75	-9.938	0.828	-4.355
	(4.189)	(5.004)	(6.382)	(5.849)	(10.346)	(5.766)	(5.272)	(3.397)
q95								
Always in AGOA	-3.112***	-1.926***	-0.356	-0.462	-0.784	-0.956	-0.410	-0.221
	(0.230)	(0.306)	(0.605)	(0.515)	(0.670)	(0.615)	(0.234)	(0.245)
Constant	5.978	-11.92	16.22	-7.437	34.45	2.907	9.143*	-0.735
	(5.944)	(8.759)	(12.094)	(8.206)	(18.466)	(7.776)	(4.632)	(6.211)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	548	524	509	507	564	441	584	580

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variable is USA/EU export ratio. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries. $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

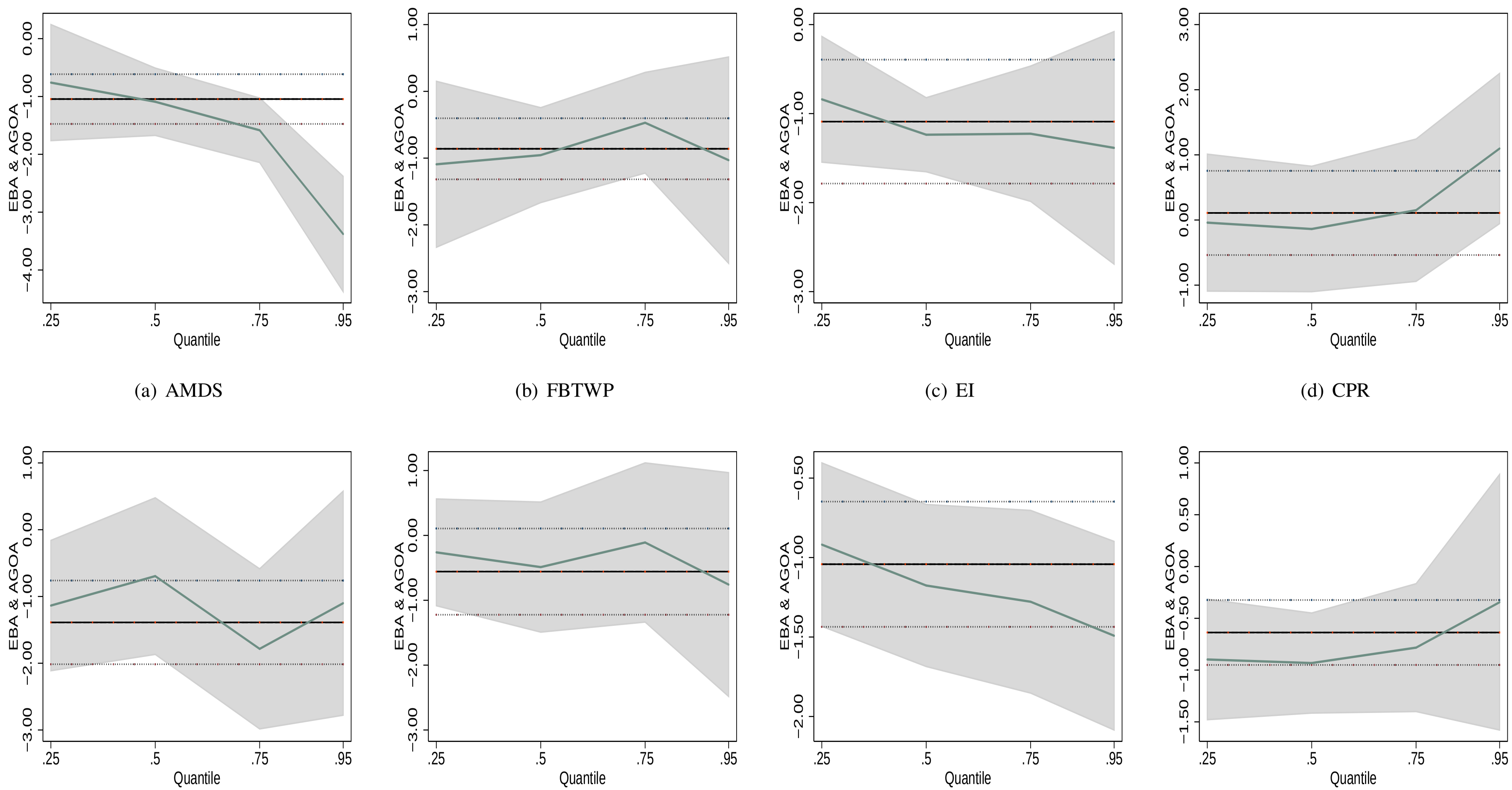


(a) AMDS (b) FBTWP (c) EI (d) CPR

(e) TALF (f) ISOM (g) METE (h) OI

Controls include: English, Spanish & landlocked dummies, logs of distance, area & gdp and Mundlak terms & year dummies. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Figure 5.16: *Estimated quantiles with confidence intervals: (Panel) based on all countries provided with AGOA (USA/EU), Table 5.16.*

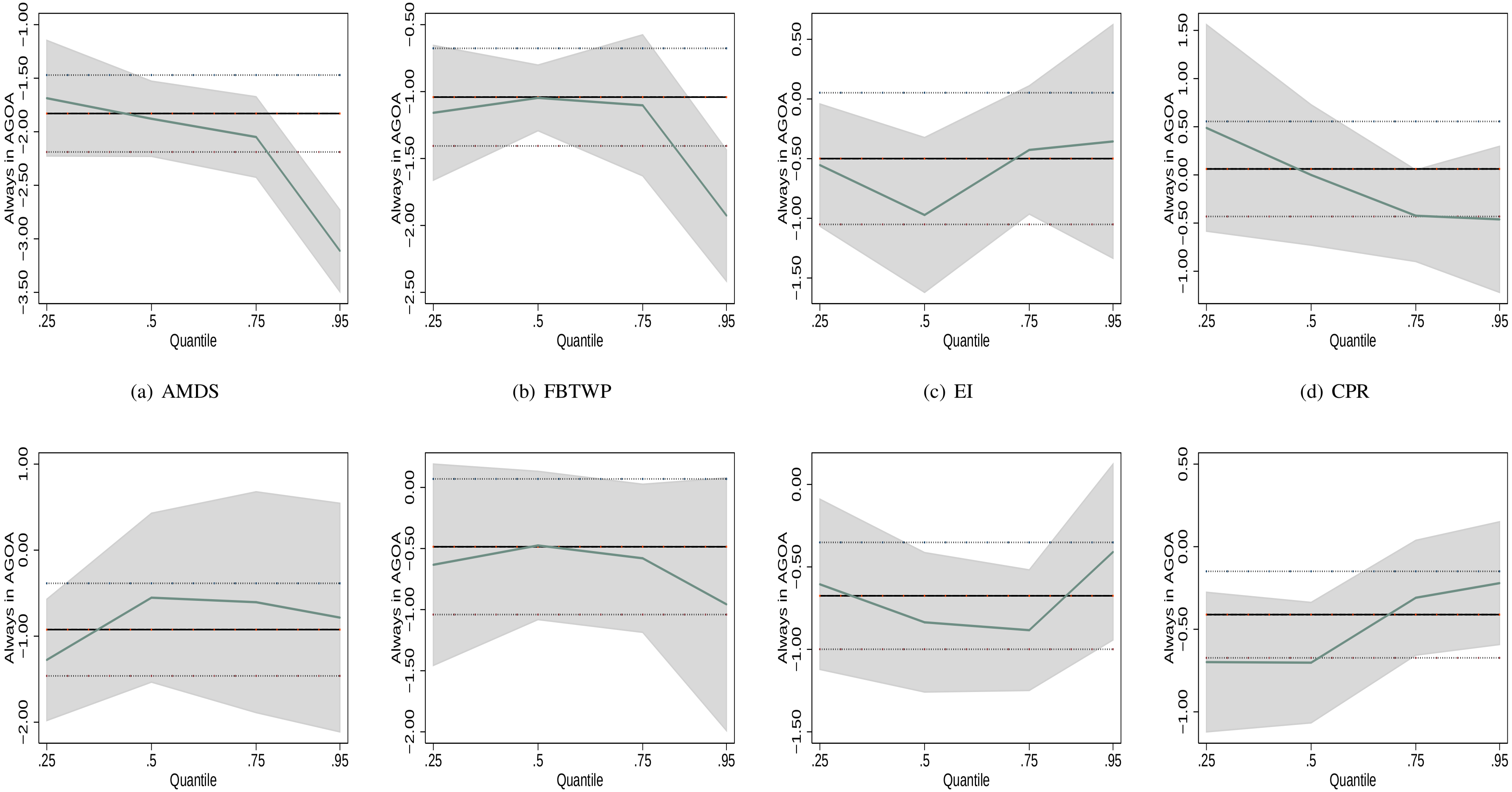


(a) AMDS (b) FBTWP (c) EI (d) CPR

(e) TALF (f) ISOM (g) METE (h) OI

Controls include: English, Spanish & landlocked dummies, logs of distance, area & gdp and Mundlak terms & year dummies. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Figure 5.17: *Estimated quantiles with confidence intervals: (Panel) based on USA/EU export ratio for countries having both EBA & AGOA preferences (USA/EU), Table 5.17*



(a) AMDS (b) FBTWP (c) EI (d) CPR

(e) TALF (f) ISOM (g) METE (h) OI

Controls include: English, Spanish & landlocked dummies, logs of distance, area & gdp and Mundlak terms & year dummies. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Figure 5.18: *Estimated quantiles with confidence intervals: (Panel) based on countries always in AGOA (USA/EU), Table 5.18*

5.4.6 Robustness

Our earlier results in the previous section did not take into account the time AGOA was provided to beneficiary countries. Thus, we defined four treatment variables to account for pooling all AGOA countries together. In this section, we resort to the SITC revision 1 data on (mirror) exports to the USA to provide a longer time dimension to study the impact of the preferences. Secondly, we categorise exports into "total (including crude oil and products)" and "non-oil" exports. This way we can show the importance of oil exports in the performance of the AGOA preference. Table (5.19) provides the results for the robustness analysis[18]. The first two columns use the full sample period, 1975 – 2012. Columns three and four are based on data for the period 2000 – 2012 (to be consistent with the previous sections) while the last two columns use data for the period 1990 – 2012. One key issue, is to check whether the choice of the time period is sensitive to observing the heterogeneity among the AGOA exporters found in the earlier sections. In this section, the full difference-in-difference design is adopted—given that, we provide data prior to the provision of AGOA unlike the earlier sections. The earlier sections were mainly concerned with post AGOA outcomes by comparing countries that had been matched with the control countries based on a propensity score from the previous chapter. In this section, the countries used in the analysis are based on the pool of countries used in the synthetic control analysis of the previous chapter. Data constraints led to the final number of countries being 65—made up of 38 control and 27 treated countries.

The results in terms of the heterogeneity are no different from the earlier results. In summary we find the impact to be different across the estimated quantiles and figure (5.19) supports this assertion. All six panels in the figure show that at least one of the estimated quantile coefficients is significantly different from the other quantile coefficients. This can be verified in the graph by observing how the quantile coefficient plot extends beyond the OLS confidence bands at both the upper and lower limits. In fact, for the total exports—which includes oil exports, several of the estimated quantile coefficients in the plot fall outside the OLS confidence bands compared to the plots that exclude oil exports. This is visible at both ends of the distribution as well as at the middle of the distribution. Given that our control countries include large oil exporters such as Venezuela, Saudi Arabia and other smaller oil exporting countries it may not be surprising to find these results at the lower quantiles. However, given the composition of control countries the large impact at the top of the distribution does inform us of how competitive the AGOA oil exporters are in the American market. Besides, these countries have enough capacity to match some of the largest oil producers in the world and others who are much closer (in distance) to the USA. The exclusion of oil, therefore eliminates the positive impact even though we do observe that the quantile coefficient estimates are dissimilar over the distribution of exports.

Figure (5.19) provides evidence to support the difference in the impact at the various quantiles estimated. Although table (5.19) shows only five estimated quantiles, figure (5.19) provides

[18]The treated countries in the table include: Angola, Benin, Burkina Faso, Burundi, Cameroon, Chad, Republic of Congo, Djibouti, Ethiopia, Gabon, Gambia, Ghana, Kenya, Malawi, Mauritius, Mozambique, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, South Africa, Tanzania, Togo, Uganda and Zambia. The control countries are: Afghanistan, Algeria, Argentina, Bahrain, Bangladesh, Brunei, Comoros, Egypt, Fiji, India, Indonesia, Iran, Jordan, Kuwait, Lao PDR, Lebanon, Macao, Malaysia, Mongolia, Morocco, Nepal, New Caledonia, Oman, Pakistan, Papua New Guinea, Paraguay, Philippines, Qatar, Saudi Arabia, Singapore, Solomon Islands, Sri Lanka, Syria, Thailand, Tunisia, United Arab Emirates, Uruguay, Venezuela.

additional estimates at the other quantiles of interest. The quantile plots do show that, there are large scale shifts—essentially, there is an observed increase (and in other cases decrease) in the size of the quantile coefficients. Similarly, we find location shifts in a few plots such as panels (a), (b), (c) and (f) between the 30th and 60th quantiles. The other graphs do not show obvious location shifts although over a small range of quantile coefficients we observe short horizontal sections of the quantile coefficient plot. We now describe the results from the table.

The results in table (5.19) points to the robustness of our earlier results. For both non-oil and total (including oil) exports, the impact of AGOA on beneficiary countries varies according to the position of the beneficiary on the export distribution. For non-oil exports we observe a significant and negative coefficient at all quantiles of the export distribution. An implication of this result is that non-oil exports to the USA of the treated countries are lower compared to the control countries at the quantiles estimated holding all else constant. This finds support in the literature and in our previous tables. On the contrary, total exports (including oil) shows a different picture at the upper tail of the distribution. Including oil in the export values, changes the impact at the 90th and 95th percentiles to become positive. Thereby indicating that, countries at the 90th and 95th percentiles compared to the control countries have higher exports to the USA all things equal. In spite of this difference across the non-oil and total export outcomes the coefficients are significantly different across the estimated quantiles in both cases.

The result shows the importance of oil in the exports of the recipients and further supports our results in the previous chapter. Thus, oil exporting countries are driving the positive coefficients observed at the top end of the distribution. The same cannot be said of non-oil exports—the composition of the exporters at the top end are exporting comparatively lower values to the USA and hence unable to push up the gains at the top part of the distribution. Comparing the composition of these countries we find that Nigeria, Angola, Chad, Gabon, and Republic of Congo in the previous chapter showed higher exports than their synthetic counterparts. However, for these same group of countries the exclusion of oil exports left them out of the top five and also had lower exports than their synthetic counterparts. Nigeria is the only member of this group that remains in the top five for the mean non-oil exports over the post agoa period. Of note is that, the magnitude of the impact for non-oil is larger at the top of the distribution—indicating that the losses are larger for the top 5% – 10% of AGOA exporters. Similarly, the magnitude is larger at the top end for total exports—indicating that the gains obtained by the top AGOA exporters are larger in absolute value when compared to the losses by the beneficiaries at the other quantiles estimated.

In table (5.19), the coefficient estimates at the 95th quantile are 2, 0.9, 2.9, 1.3, 2.5, and 1.7 times the 25th quantile coefficient estimates in columns (1) – (6). Apart from column (2) having a smaller coefficient in absolute value than the 25th quantile coefficient, all remaining columns show quite larger coefficient values compared to the 25th quantile as the numbers above show. In terms of non-oil exports, the 95th quantile estimates are negative and significant in all three columns. In columns (1), (3) and (5) the AGOA countries show 84.3%, 82.7% and 78.6% lower exports to the USA compared to the control countries, and all things equal. Using sub-periods of our 1975–2012 sample in this section, does not change the signs of the estimated coefficients neither does it eliminate the unequal impact at the various quantiles estimated. One exception is the 75th quantile coefficient in column (4)—we observe a positive but insignificant coefficient.

The implication of this is that, our results of an unequal impact is robust to time as well as to the composition of the control countries included in the regressions. Extending the time period to 2012—two years beyond the analysis in the previous section has not affected the conclusions of the previous section. The unequal impact at the various quantiles of exports remain. The impacts are similar across the total export outcomes across the three columns—columns (2), (4) and (6). All things equal, the impact at the 95th quantile implies that, the AGOA countries have 104%, 120.7% and 101.8% higher exports to the USA relative to the control countries. We attribute the positive impact at the 90th and 95th quantiles to the inclusion of oil exports in the dependent variable—total exports. This as explained previously is driven by the oil exporting countries, namely, Angola, Chad, Gabon and Nigeria among others. These countries are among the top ranked AGOA exporters and hence are among the largest SSA exporters to the USA.

The impacts at the 75th quantile and below are all negative and significant with the exception of the 75th quantile coefficients in columns (2) and (4) for total exports. At the 25th quantile, AGOA countries have 59.8%, 53.9%, 45.2%, 45.2% 46.4% and 45.4% lower exports compared to the control countries all things equal in columns (1)–(6) respectively. At the median the impacts are 53.4%, 51%, 54.7%, 29.7%, 54.5% and 40.1% in all six columns respectively. Indicating that in some columns the median impact is only marginally larger (or smaller) in magnitude in the table. The lower impact implies that countries finding themselves at the 75th quantile and below have not been able to increase their exports above that of the control countries. This follows from our argument that very few AGOA countries actually find an appreciable increase in their exports over the period.

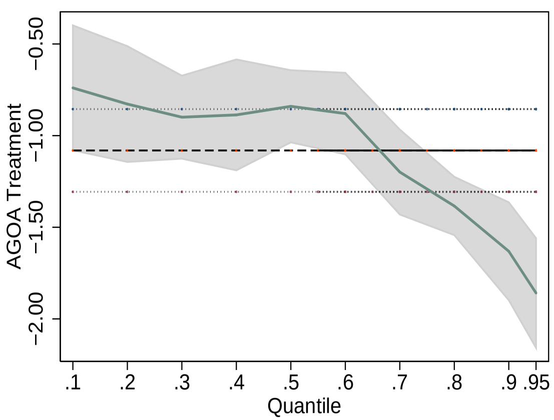
One explanation we can provide here for the results is that the countries at these points of the export distribution are unable to sustain the increased exports they enjoyed initially after taking part in the programme. Another explanation could be the increased capacity and competitiveness of the control countries. The majority of the control countries accessing the USA market do not enjoy the tariff preferences that the AGOA countries enjoy, thus, they put in a lot more effort at reducing costs and raising capacity to export more to the USA market. As explained earlier, at the top of the distribution the AGOA countries have large oil exporting capacities and their oil sectors are largely owned and managed by foreign multinational companies thereby providing them an advantage over the control countries—both in terms of capacity, managerial know-how and foreign direct investments. A probable distinction that can also be made and that may explain the impact of AGOA given our quantile regression is the pricing of exports. Oil products are generally sold at world prices that is largely affected by the actions of the organization of petroleum exporting countries (OPEC) in restricting output while the majority of the non-oil exports of the AGOA countries depend to a great extent on prices determined in the world market with no recourse to change those prices by restricting output.

In the next section, we provide a general discussion of the results and tie-in the results to the five questions posed in the introduction to this chapter.

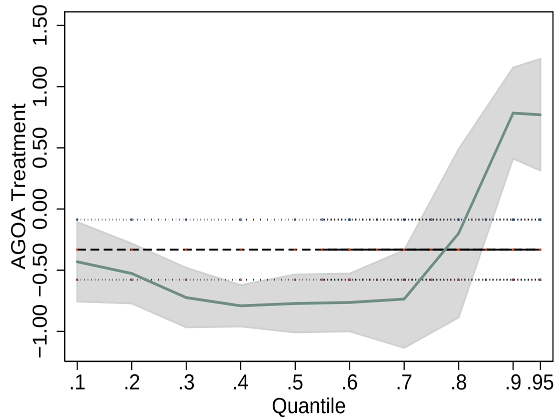
Table 5.19: Robustness: Quantile regression estimates–Non-Oil vs. Total exports, 1975 – 2012

	(1) Non-Oil[1]	(2) Total[1]	(3) Non-Oil[2]	(4) Total[2]	(5) Non-Oil[3]	(6) Total[3]
q25						
AGOA Treatment	-0.910***	-0.775***	-0.602***	-0.601***	-0.623***	-0.605***
	(0.146)	(0.154)	(0.166)	(0.172)	(0.144)	(0.162)
GDP (logs)	0.995***	0.823***	0.360	-0.0227	0.518***	0.599**
	(0.123)	(0.156)	(0.348)	(0.309)	(0.143)	(0.194)
Constant	-47.86***	-36.55***	-49.82***	-38.45***	-50.14***	-37.03***
	(3.207)	(2.510)	(4.018)	(4.348)	(3.466)	(3.504)
q50						
AGOA Treatment	-0.764***	-0.713***	-0.791***	-0.353*	-0.787***	-0.513***
	(0.152)	(0.129)	(0.136)	(0.141)	(0.133)	(0.132)
GDP (logs)	0.968***	1.095***	-0.0353	0.644	0.611**	0.727**
	(0.135)	(0.157)	(0.363)	(0.364)	(0.188)	(0.236)
Constant	-38.06***	-27.42***	-37.72***	-25.35***	-39.20***	-26.03***
	(2.899)	(2.199)	(4.590)	(4.263)	(3.280)	(2.889)
q75						
AGOA Treatment	-1.306***	-0.517	-1.192***	0.171	-0.954***	-0.264
	(0.114)	(0.274)	(0.185)	(0.357)	(0.142)	(0.316)
GDP (logs)	0.854***	1.080***	0.0928	1.279	0.357	1.361**
	(0.184)	(0.208)	(0.366)	(0.826)	(0.211)	(0.475)
Constant	-26.34***	-7.315**	-27.07***	-9.882	-25.56***	-9.699*
	(1.908)	(2.660)	(2.874)	(5.427)	(2.199)	(4.551)
q90						
AGOA Treatment	-1.632***	0.872***	-1.635***	0.684**	-1.352***	0.772***
	(0.166)	(0.184)	(0.160)	(0.215)	(0.123)	(0.187)
GDP (logs)	0.622**	0.780***	0.0910	0.501	-0.0423	0.570*
	(0.193)	(0.158)	(0.399)	(0.497)	(0.236)	(0.254)
Constant	-23.51***	-1.178	-21.81***	5.068	-21.71***	-0.202
	(2.877)	(2.665)	(3.855)	(5.090)	(3.733)	(3.621)
q95						
AGOA Treatment	-1.850***	0.713**	-1.757***	0.792***	-1.543***	1.011***
	(0.156)	(0.240)	(0.198)	(0.220)	(0.190)	(0.235)
GDP (logs)	0.517***	0.601***	-0.364	0.694	-0.273	0.257
	(0.153)	(0.139)	(0.372)	(0.392)	(0.203)	(0.195)
Constant	-19.31***	-4.336	-17.19***	6.384	-15.46***	5.452
	(3.103)	(3.508)	(3.042)	(5.538)	(3.341)	(4.688)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2295	2295	820	820	1443	1443

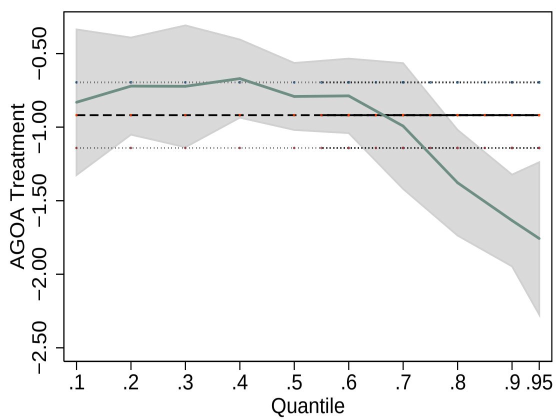
Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is imports by USA. Quantiles selected are 0.25, 0.50 0.75 0.90 & 0.95. Other Controls not shown include: log of weighted distance, log of area, English, Spanish & landlocked dummies. AGOA dummy = 1 in year of provision and zero otherwise. Countries provided AGOA in December of the year of provision are coded as having AGOA the following year. [1]: Data is for the period 1975 - 2012. [2]: Data is for the period 2000 - 2012. [3]: Data is for the period 1990 - 2012.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$



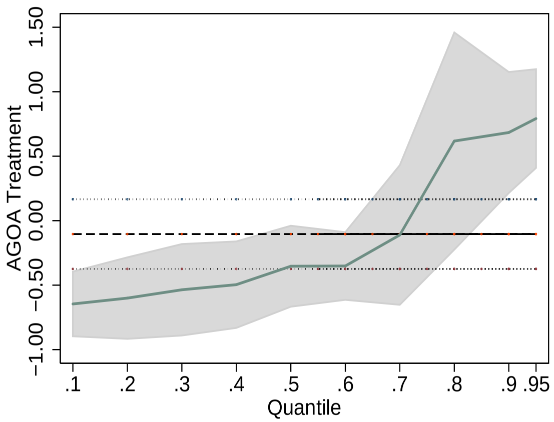
(a) Non-Oil: 1975 - 2012



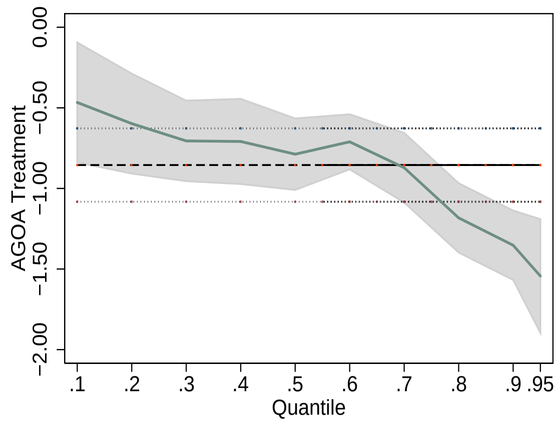
(b) Total: 1975 - 2012



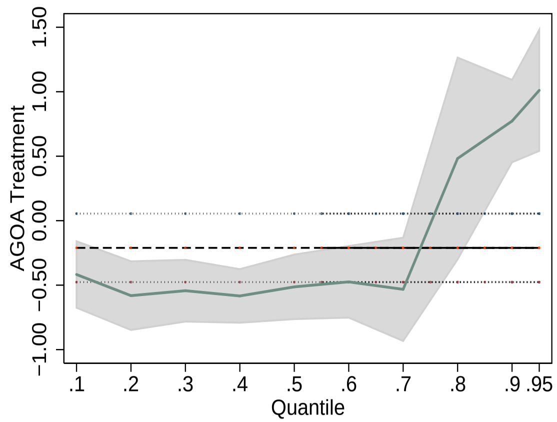
(c) Non-Oil: 2000 - 2012



(d) Total: 2000-2012



(e) Non-Oil: 1990 - 2012



(f) Total: 1990 - 2012

Controls include: English, Spanish & landlocked dummies, logs of distance, area & gdp and Mundlak terms & year dummies. Quantiles estimated are 0.1–0.9 & 0.95 incrementing by 0.1. Standard errors are based on 500 replications

Figure 5.19: *Estimated quantiles with confidence intervals, Table 5.19*

5.4.7 General discussion

In returning to our initial questions at the beginning of this chapter, we note that the results have answered majority of the questions we had in mind when we designed the empirical analysis in this chapter. Textile, apparel, leather and footwear products have not shown any positive impact so far. This finding is supported in recent work by McKay (2012); Rotunno et al. (2012) among others. This points to the fact that, AGOA beneficiaries are not as competitive in the apparel and textile market as has been shown in the past. Essentially, the initial gains of the apparel and textile preferences have not been sustained throughout the period. An indication that China is not their only competition but also, other Asian and Caribbean Basin countries do export more of the TALF products. It must be noted that, their position in this sector has been due to a number of factors including but not limited to, the removal of the multifibre arrangement (MFA), the inclusion of similar apparel and textile preferences in programmes offered to the Caribbean Basin countries and the new competition that has arisen as a result. Nonetheless, China is able to export directly to the USA given the removal of the MFA[19]. We summarise the evidence for each question below.

- **Have the exports of AGOA recipients suffered to other destinations as a result of the AGOA preference?** Our results do not indicate that the exports to the EU has suffered due to the AGOA preference. However, from the results based on the ratio of USA to ROW exports, the positive coefficients indicate that relatively more exporting to the USA has occurred compared to ROW. This might be an indication that, the AGOA recipients are sacrificing exports to other destinations (excluding EU) to increase their exports to the USA given that they receive limited preferential tariffs in destinations other than the USA and EU. The competitive preferences provided by the EU has helped AGOA countries maintain if not increase their current exports to the EU.

- **Are there any differences in the impact across the various quantiles of the export distribution?** The results show that there are significant differences across the distribution of total exports to the USA. We do also find some of these differences in particular products such as the extractive industry; agricultural, meat, dairy and seafod; food, beverages, tobacco, wood and paper; chemicals, plastics and rubber; textiles, apparel, leather and footwear; iron, steel, and other metals; and machinery, electronics and transportation equipment products. The heterogeneous nature of AGOA can therefore be seen in the scale shifts present in the plots of the quantile coefficients shown in the results section. Although in some parts of the plots we find location shifts which indicate that the estimated coefficients remain the same across the quantiles estimated. The evidence supports larger magnitudes of the impact at the top half of the distribution of exports.

- **What factors explain the "raw" gap between exports of AGOA and non-AGOA recipients?** Much of the difference in the treated and control countries can be explained by covariate and coefficient differences between the two groups. While the coefficient differences exert a positive effect on the difference between the two, the covariate difference more than offsets the positive effect to send the total effect below zero and thus the negative

[19] McKay (2012); Rotunno et al. (2012) provide more details on issues related to the apparel and textile preferences.

impacts observed in the tables presented earlier in the chapter. Arguably, more could be done to further decompose these effects. However, that is beyond the current analysis and would be explored in future work

- **Is the quantile impact affected by the choice of countries used as the counter-factual?** Additional results in the appendix point to the robustness of our estimates. The heterogeneous effects as well as the significance and signs of the coefficients are for the most part maintained when additional countries are included in the analysis. Furthermore, excluding the top products, although removes the positive impact still shows that there is an unequal effect across the distribution. Moreover, the robustness section provides results for a longer time period based on 27 treated and 38 control countries. These changes in the composition of the treated and control countries did not eliminate the differences observed in the estimated coefficients across the various quantiles estimated.

- **Is the AGOA impact only present for apparel & textiles and crude oil exporting countries?** The results of the product analysis finds no positive impacts for apparel and textile producers. On the contrary, oil exporters experience the largest gains of AGOA. The crude oil producers together with other extractive industry exporters do experience gains at the 75th and 95th quantiles of the export distribution of the product. They are thus, more competitive in the American market compared to their counterparts that are not AGOA beneficiaries. We find that the extractive industry is the main driver of the export gains found at the 95th percentile when the exports to the USA of AGOA countries is compared to the counter-factual (or control) countries in the sample. Nonetheless, another product that tends to show some promise and for which gains are observed at the median (and 25th quantile) is the food, beverages, tobacco, wood and paper products sector. Furthermore, gains to agriculture, meat, dairy and seafood products are at the 25th and 50th quantiles in one case. As the recent literature shows, the possible explanation for the poor performance of apparel and textiles, is the removal of the multi-fibre arrangement (MFA) and the fact that China no longer faces quotas in the American market for apparel and textile products. Again, the robustness section lends support to the fact that oil exports are driving the gains in AGOA. Excluding oil exports eliminate any gains observed at the top of the distribution. Despite observing the gains in the two clusters, FBWTP and AMDS earlier in the product results—these products found within the non-oil exports are unable to drive up the gains for the AGOA exporters in table (5.19). In this case, the gains in these clusters are probably not high enough to offset the comparatively lower exports in the other clusters compared to the control countries.

The insights we obtain from the analysis in this chapter are that (a) the distribution of benefits to recipients of AGOA is unequal with larger exporters and crude oil exporting countries reaping majority of these benefits; (b) the composition of AGOA (in terms of whether these countries consistently maintain the preference throughout the sample or are removed from the preference a number of times) countries does not change the impact of AGOA in major ways. In other words, excluding countries that do not enjoy the AGOA preference consistently or maintaining them in the analysis does not change the impact of AGOA neither does it remove the unequal distribution of the impact towards oil exporting countries. The differences in the impact are marginal at best—

indicating that compositional effects of the choice of AGOA countries does not affect the quantile results; (c) the comparator countries (in this case the counter-factual countries) do not change the result that the impact is heterogeneous; (d) the choice of products included in the analysis are key to the gains observed for the AGOA countries. The gains are concentrated in a few products. Inclusion of crude oil products widen the unequal benefits—thereby leading to large inequalities in exports of the AGOA recipients. Generally, countries exporting the products offering the gains are the exporters that tend to enjoy the most benefits of their AGOA status.

The lessons therefore in analysing AGOA is that, the choice of countries is not a major deciding factor in the impact of AGOA. It may lead to a reduction of the AGOA impact but does not entirely eliminate it when the comparison is with other developing countries. In terms of methodology, OLS estimates are likely to be riddled with heteroscedastic standard errors leading to wrong test statistics. This combined with the outlying exporting countries is likely to overstate the average impact and statistical significance of any least squares estimation performed. The quantile regression which tends to be more robust to heteroscedasticity and outliers compared to OLS would be a more appropriate approach in estimating the impact. A caveat to the quantile regression is that, there have not been applications of this to gravity models and the presence of incidental parameters makes it difficult to incorporate country-year fixed effects in the estimated gravity model. The median estimates in our results above were in almost all cases lower in magnitude compared to the OLS estimate as shown in the graphs presented. We therefore suggest that in studying the impact of trade preferences in general (not only AGOA preferences) the median regression results should be reported together with the least squares or alternative non-linear approaches to provide a more accurate picture of the impact of the preference. This is mainly because some developing countries are more able to take advantage of the preferences and thus find themselves among exporting nations at the upper tails of the export distribution. This is however, more relevant with aggregated data than with highly disaggregated data (as in chapter 3 for example). One reason is because highly disaggregated exports have numerous zeros and low values for developing countries, hence other robust methods such as the Heckman selection or poisson pseudo maximum likelihood models are required.

5.5 Conclusion

To conclude we have found that the largest exporters to the USA tend to benefit the most from AGOA. Almost all these exporters (particularly the top five countries) are also crude oil producers hence cementing their gains through the exports of crude oil and products. Not surprisingly, due to the recent literature on apparel and textile exports we do not find any significant impact compared to the counter-factual countries of an upsurge in apparel/textile products relative to the control countries. More interestingly, the food, beverages, tobacco, wood and paper product sector has been a more competitive sector for other members of AGOA and these countries find themselves at the bottom 25th to median quantiles of the distribution of that product. These results generally find support for the title of this chapter. That is, *is there a heterogeneous impact on exports to the USA? Yes*, we find that the impact is unequal and the gains we find for total exports to the USA is at the top half of the distribution of total exports to the USA.

There are a few caveats to the current chapter. First, the increase/decrease in impact shown in the estimations are in comparison to the control countries and do not imply an increase/decrease in absolute exports by each AGOA country. Rather, they imply that in comparison to a set of countries similar to the AGOA countries they exported more or less comparatively. Secondly, this is arguably an initial attempt to explore the unequal distribution of AGOA gains for the recipients. And thus, our framework requires more work to strengthen our conclusions as well as improve upon our causal framework. Particularly, we do need to explore other ways of obtaining robust estimates for our quantile coefficients based on the panel of countries. Last but not the least, it would be useful to revisit the decomposition exercise to control for additional covariates as well as identify whether the decomposition has been influenced by unobserved factors. In this regard, researchers can again draw upon existing studies in the labour field employing selection methods to control for unobserved factors and endogeneity. These are areas of interest that would be explored in future work.

Chapter 6

Conclusion

6.1 Summary

In this thesis, we have provided an analysis of the impact of the African Growth and Opportunity Act (AGOA) and Caribbean Basin Trade Protection Act (CBTPA) trade preferences for the beneficiary countries. We provided a different approach to analysing the impact of trade preferences. A quantitative summary of the literature is provided in chapter 2 where we undertake a meta-analysis of the literature supported by a meta-regression. The meta-analysis shows that the pooled effect of AGOA on exports is positive and approximately 12.8%. A subsequent meta-regression analysing the variation in reported study effects shows that, the large differences in reported coefficients is due to differences across study designs. For instance, the econometric techniques, sample size, number of years of data, number of countries, the presence of country effects, robust standard errors, level of product disaggregation, and whether the dependent variable is in logs all contribute to the differences in reported coefficients and t-statistics. In sum, these factors either contribute to larger reported t-statistics or the reduction of the reported t-statistics leading to insignificant estimates. We do not find conclusive evidence on publication bias. Despite having funnel plots showing graphical evidence of publication bias—formal tests of publication bias is inconclusive in this study. In addition, evidence on a true empirical effect beyond publication bias is also inconclusive. The results on publication bias and the empirical effects are attributed to the small number of studies included in the analysis. It would be useful to acquire more studies to allow for a more conclusive analysis of publication bias and the true empirical effects of AGOA.

The CBTPA preferences were analysed together with the AGOA preferences in chapter 3. The focus of the chapter was to investigate whether the preferences led to higher exports to the USA compared to exports of the beneficiaries to the rest of the world. Drawing upon and extending the empirical approach by Collier and Venables (2007) we determine whether the preferences led to higher exports. The results indicate that, the preferences had a positive impact on exports to the USA. We also find that, the HS-6 and HS-2 levels of disaggregation provide more consistent estimates compared to the HS-4 estimates that tend to switch signs across the models estimated. The results indicate that at higher levels of aggregation the regressors were correlated thereby reducing the number of significant estimates in the regression. A related finding shows that the random effects model yields inconsistent parameter estimates which were twice the estimates of the fixed effects, Mundlak corrected random effects and Heckman selection models. Meanwhile the

Poisson pseudo maximum likelihood was the most efficient—thus, providing the lowest standard errors. The second (chapter 4) and third (chapter 5) empirical chapters focus on the impact of AGOA on the beneficiaries.

In chapter 4 we adopted the propensity score matching and exact matching approaches found in the evaluation literature. These methods provide a convenient approach to constructing a set of counter-factual countries that the AGOA beneficiaries can be compared with. The results based on these two approaches indicate lower exports by the AGOA countries compared to the counter-factual. We did not find evidence of an increase in exports to the USA due to AGOA. In terms of the various product clusters we do not find a positive impact. For instance, two clusters—the extractive industry and textiles, apparel, leather and footwear clusters did not show any increase in exports due to AGOA. This was contrary to our expectations. While the extractive industry cluster was never significant, the significant estimated treatment effects for the textile cluster was always negative. We attribute the non-significance and negative impact to the crowding-out effects occurring—due to averages calculated by combining the treated countries and the products within the clusters. One issue in terms of the product clusters, is that, the extractive industry included other extractive type products such as minerals and ore among others. The textile cluster included footwear and leather products which we believe led to the lower mean values for the cluster.

Essentially, the additional products included within these clusters for our analysis led to the mean for these product clusters to be lower due to the additional products that were not key exports of the AGOA beneficiaries. As a result, we proposed an alternative approach to investigate the impact of AGOA. The synthetic control method due to Abadie et al. (2010); Abadie and Gardeazabal (2003) was adopted. The approach allowed us to focus on each treated country and follow the evolution of its exports over the sample period. Using this approach we found a positive impact of AGOA for some of the top five AGOA exporters to the USA. Oil products were the key to the benefits—and the major oil exporters such as Angola, Nigeria and Congo showed a positive impact of the preference. Kenya was the only non-oil exporting country to have seen an increase in their non-oil exports relative to the counter-factual.

Finally, chapter 5 investigating the same issue using a quantile regression shows that, the benefits have been unequal among the recipients. As observed in the latter part of chapter 4, very few countries and mainly oil exporting countries are the largest AGOA exporters. The majority of AGOA countries have relatively lower exports to the USA—and these countries in mean regressions tend to underestimate the overall impact of AGOA. The quantile analysis reveals that the benefits of the preference can be found at the upper tail of the export distribution. This indicates that, the countries benefiting from their AGOA status are mainly the large exporters to the USA. Furthermore, the countries benefiting are the countries exporting crude oil products—with a few exceptions such as South Africa. The large disparity between the countries leads to our conclusion that, the benefits from AGOA are heterogeneous and concentrated among a few countries rather than all countries provided the preference. Additional results explaining the difference we find between the AGOA and non-AGOA countries shows that, differences in the characteristics of the countries and the differences in the coefficients explain the total difference in the export distribution between the AGOA and non-AGOA countries.

6.2 Lessons and contribution of the thesis

The major contribution of the thesis is the new approach of analysing the impact of AGOA and adjusting for the heterogeneity in the uptake of AGOA. We summarise the insights as follows: (a) the distribution of benefits to recipients of AGOA is unequal with larger exporters and crude oil exporting countries reaping the majority of these benefits; (b) the composition of AGOA countries (in terms of whether these countries consistently maintain the preference throughout the sample or are removed from the preference a number of times) does not change the impact of AGOA in major ways. In other words, excluding countries that do not enjoy the AGOA preference consistently or maintaining them in the analysis does not change the impact of AGOA neither does it remove the unequal distribution of the impact towards oil exporting countries. The differences in the impact are marginal at best—indicating that compositional effects of the choice of AGOA countries does not affect the quantile results; (c) the comparator countries (in this case the counter-factual countries) do not change the result that the impact is heterogeneous; (d) the choice of products included in the analysis are key to the gains observed for the AGOA countries. The gains are concentrated in a few products. Inclusion of crude oil products widen the unequal benefits—thereby leading to large inequalities in exports of the AGOA recipients. Generally, countries exporting the products offering the gains are the exporters that tend to enjoy the most benefits of their AGOA status.

The analysis shows that the level of disaggregation is important in identifying the impact of the preference. Given that preferences are provided at the tariff level requires the use of data with high levels of disaggregation. The analysis in chapter 3 shows that using aggregated levels of data can cloud the impact and potentially make the impact seem larger than they are. Nonetheless, the highly disaggregated data can fail to show an impact due to the small number of exports observed at that level. Thus, to identify the impact it is useful to think about whether the effect being studied is hypothesised at the tariff level or at a more aggregated level.

Moreover, the results also show that AGOA countries are more competitive in the European market than the CBTPA countries. The same cannot be said of the American market. The CBTPA countries on average, are more competitive with higher exports compared to the AGOA countries in the American market. Again, this might be due to the close proximity of the CBTPA countries to the American market as well as the additional preferences America has provided them.

Last but not the least, much of the positive impact on exports is due to temporary switching of exports between preference programmes offered by the USA as well as switching between countries offering preferences. Thus for example the USA offers AGOA and CBTPA beneficiaries access to the GSP preference. Haiti for example, has access to the HOPE initiative and least developed countries have access to special GSP preferences providing them further tariff preferences over and above that of the GSP. Such competing preferences by the same country leads to recipients switching between preference programmes they can access[1]. The same applies in the case of the EU whereby some GSP recipients can additionally receive EBA and GSP+ preferences. The competing preferences can also be across countries. Some SSA countries receiving the EBA preferences, for example, can find the AGOA preferences to have competitive tariff rates comparable to the EBA

[1]Aside from the competing preferences, also the MFN tariff rates can be quite close to the preferential rates. In cases where they are as attractive as the preferential rates countries avoid using them due to their excessive rules of origin and other bureaucratic obstacles.

and in some cases and for some products actually offer much more appealing rules of origin and tariff rates. In such cases, countries are more likely to switch exports from the EU to the USA in those products.

Finally, a key contribution to the literature is in terms of methodology. We have looked at the impact of AGOA by adopting tools from the evaluation literature that is yet to be introduced in studying the impact of trade preferences. These tools include the propensity score matching, exact matching and synthetic control methods from the evaluation literature. Also, our use of the quantile regression framework in the previous chapter provides new insights on the impact of AGOA that have been summarised above. We believe these tools can be extended and improved upon to analyse trade preferences in general.

6.3 Policy implications

In designing trade preferences developed countries should take into account that, the impact varies across the export distribution. Much of the initial impact of the trade preference is not sustained throughout the initial years after the provision of the preference. For developing countries, in signing up for trade preferences, they should bear in mind what the impact is on their exports to other destinations. In the short run exports are mainly switched from other destinations to the destination offering the most attractive preferences. In order to maintain the level of exports in the longer run, developing countries need to provide supporting policy that creates an environment favourable for increased production and industrial activity. This way, the short run increases in exports to the preference giving country is sustained and not lost due to a return to the *status quo*. The preference recipients can scale-up exports and maintain the higher level of exports in the long-run.

However, it is the view of the author that, trade policy should not focus on solely taking advantage of these preferences. Trade policy should additionally look at developing relationships with countries that might be in close proximity and thus be less costly to export in terms of distance and transportation costs. Some of these countries are neighbours of the AGOA countries as well as nearby countries in North Africa and the Middle East. It would be useful for AGOA recipients (not only AGOA recipients but other African and Caribbean Basin countries in general) to develop these relationships that have been forgotten and left to the occasional historical trade relations with neighbours. Developing these trading relationships would go a long way in maintaining long run established trade and the South's share in world trade. Nonetheless, in carrying this out, each of these countries would have to make a concerted effort to determine their comparative advantage and provide forward and backward linkages with industry in their respective countries. Taking advantage of these linkages would also put them in a better position to take advantage of the preferences offered in the EU and USA markets as well as meet some of their current capacity constraints. For SSA countries, this should not be difficult since the various regions on the continent (East, West, Central, Southern) already either have existing common markets or free trade agreements. This is one way to take advantage of these common market arrangements. It is time for the SSA countries to go beyond having an agreement on paper to actually implementing it in practice.

6.3.1 Implications for the USA

A useful question is, what is the EU doing that is enabling SSA countries to be more competitive in their markets compared to the American market as provided in the literature (for example, Di Rubbo and Canali, 2008; Nilsson, 2005)? There are several trade policy initiatives, trading and political relationships fostered a number of decades ago between SSA countries and countries in Europe. One advantage the EU has over the USA is its past relationship with its former colonies in Africa. This has been found to be one of the strong predictors of trade in gravity models. Secondly, language also shows up as increasing trade among countries. English speaking countries should therefore not have a disadvantage in the American market given that English is the *lingua franca* of the USA. Nonetheless, the distance to the USA compared to the EU market could be one of the obstacles reducing the competitiveness of SSA countries in the American market. For instance, the Caribbean Basin and South American countries are in close proximity to the American market than the SSA countries. Thus, the USA need not only focus on tariffs but look at other ways to reduce the export costs of the SSA countries. As discussed in the rules of origin literature, this can be one avenue for reducing the costs of the SSA countries.

Another means of reducing these costs is to allow greater cumulation of production among not only the SSA countries but also allow them to access inputs from cheaper sources even if they are from countries the USA does not provide preferences. This way production costs for the SSA countries would be reduced compared to sourcing inputs from higher cost countries. The advantages gained by the SSA countries might be much higher than any gains by the source countries outside the cumulation arrangements. A final option would be to tailor preferences to the key products exported by developing countries—especially for the small exporters. This way they can be provided specific tariff preferences that would be more relevant to the products they export rather than the generic preferences that are currently in vogue. This would arguably not find favour with preference providers and would involve an increase in the administrative costs of the preferences. However, it is most likely that, the benefits to the small exporters would outweigh these costs.

6.3.2 Implication for preference beneficiaries

There is the need to diversify exports to the USA and find ways of reducing the costs of exporting to the USA—as well as maintain information to provide to exporters, to take advantage of new market opportunities. This calls for increased investments in production for exports which can be pursued by providing incentives to investors. Most SSA countries have free zone areas that provide some support and incentives to exporters. However, these free zones must be made incentive compatible to provide exporters the necessary impetus to export to other markets. There are also a number of small family owned business. It is useful to keep these businesses unique and for them to maintain their identity. One way they can scale up their exports to the European and American markets is by forming joint co-operatives with other small/family businesses in neighbouring countries (as well as within their own countries) to export or meet the demand for American imports. These informal amalgamations would definitely provide more advantages than having a single family business trying to export African prints to Walmart, for example. The informal group of small businesses would together be able to meet the demand and produce consistently their individual shares of the collective exports. The guaranteed share of exports can actually facilitate their expansion as they would be in a better position to attract financing from the banks. Moreover, by joining forces they can enhance their chances of winning supply contracts with some of the large retail chains in the American and European markets.

6.4 Concluding comments

The analysis carried out in the thesis is not without its limitation. We note that readers might be worried about issues of endogeneity in chapter 3. In the empirical trade literature it is rather challenging to find appropriate instruments for endogenous trade-related variables. Having said this, we tried to solve issues of endogeneity by using lags of the suspect regressors. There were also hardware issues that limited the number of products we could include in the analysis of chapter 3. Hopefully, with more computing resources and adequate computer memory it would be possible to extend the analysis of the chapter to all HS-6 digit products. In chapter 4, we find that in a number of cases, hidden biases lead to unsatisfactory estimates of the treatment effect. This is a challenge in the evaluation literature and one faced in the chapter. We provide all the necessary information to give an accurate idea of the extent of the problem—several matching estimators are shown as well as a simulation of the extent of selection and output effects that can affect our conclusion in the chapter.

In chapter 5, the main limitation is that, the quantile regression provides inconsistent estimates in the presence of several regressors. This problem known in the literature as the *incidental parameters problem* leads to significant biases that can be made worse by having country-year fixed effects in the model. Yet, the gravity literature suggests that the country-fixed effects provides an adequate proxy for the multilateral price resistance terms of Anderson and van Wincoop (2003). We adopt *ad hoc* methods to resolve this issue. One such method, is the use of export ratios as the dependent variable (this is an attempt at approximating the *Tetrads* approach of Head et al. (2010)) while another, is the Mundlak/Chamberlain type random effect quantile regressions estimated. At the minimum, we ensure that year dummies are included in all the panel quantile regressions in the chapter.

The limitations of the thesis discussed above provides opportunity for further research to address these issues. Particularly, quantile regressions have not been incorporated in the gravity literature. This is an opportunity to return to the drawing board and link the quantile regression to the theoretical gravity specification to account for the multilateral resistance terms. Moreover, the HS-6 digit analysis can be extended to all products to determine whether the selection of the products have played any role in the estimates provided. Other areas of future work could include improving upon the quantile decomposition of the impact of AGOA to carefully delineate the mechanisms identifying the differences between the AGOA and non-AGOA countries. Furthermore, the decomposition exercises could be extended to panel data as these approaches are developed and introduced into the mainstream econometric literature. These methods can thus, be extended and applied to other trade preferences provided to developing countries.

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Appendix A

Appendix to Chapter Two

Table A.1: Summary Statistics

	count	mean	min	max
cofficient of agoa reported	179	16.404	-11.92	769.500
standard error of agoa reported	179	19.817	0.000360	1097.127
T-stats for coefficient	179	3.873	-7.579	307.500
T-stats for coefficient (imputed from pvalues)	25	-0.523	-1.656	2.333
number of countries	179	67.212	1	207.000
number of years	179	12.179	1	21.000
number of covariates	179	11.168	2	37.000
N: sample size of analysis	179	3.20e+05	92	9.54e+06
annual==yes	179	0.844	0	1.000
select==yes	179	0.034	0	1.000
published==yes	179	0.486	0	1.000
ctryeffects==yes	179	0.693	0	1.000
timeeffects==yes	179	0.620	0	1.000
csect==yes	179	0.028	0	1.000
otherptas==yes	179	0.425	0	1.000
gravity==yes	179	0.525	0	1.000
preferencedummy==yes	179	0.978	0	1.000
robustse==yes	179	0.425	0	1.000
productfe==yes	179	0.173	0	1.000
indctry==yes	179	0.056	0	1.000
logdepvar==yes	179	0.872	0	1.000
prodgroup==Agriculture	179	0.190	0	1.000
prodgroup==All/Total	179	0.285	0	1.000
Apparel/Textiles/Leather	179	0.140	0	1.000
Energy/Electricity/Chemicals	179	0.095	0	1.000
region==AGOA countries	179	0.547	0	1.000
y==Exports	179	0.475	0	1.000
y==Imports	179	0.492	0	1.000
time_freq==Annual	179	0.844	0	1.000
Method==GMM/IV	179	0.207	0	1.000
Method==OLS/Time series	179	0.503	0	1.000
disaggregation==6 digits and above	179	0.279	0	1.000
disaggregation==below 6 digits	179	0.240	0	1.000
disaggregation==Sector totals	179	0.207	0	1.000
start_year	179	1994.4	1990	2001
end_year	179	2005.6	2001	2010
Observations	179			

Base categories are: Other–manufacturing wood, etc for product groups; Heckman/Poisson/Tobit for econometric method; Total exports/total trade for disaggregation; AGOA plus other countries for region; Total trade and Import dummy for dependent variable definition; Monthly and quarterly frequency for time frequency. For the dummy variables the "No" category is the base category.

Table A.2: Studies included in the meta-analysis

	authors
Collier and Venables (2007)	9
Cooke (2009)	20
Cooke (2014)	20
Frazer and Van Biesebroeck (2010)	4
Giovannetti and Sanfilippo (2009)	22
Lederman and Özden (2007)	5
McKay (2012)	4
Mueller (2008)	1
Nouve (2005)	16
Nouve and Staatz (2003)	18
Seyoum (2007)	14
Tadesse and Fayissa (2008)	32
Tadesse et al. (2008)	13
Zappile (2011)	1
N	179

Table A.3: Multilevel meta analysis results

	(1) T-stat	(2) T-stat	(3) T-stat	(4) T-stat	(5) T-stat
precision	0.00522	-1.177***	-0.356*	-1.070	0.662
	(0.009)	(0.106)	(0.159)	(1.068)	(4.270)
no. of covariates		0.0267***	0.0422***	0.0423***	0.0423***
		(0.002)	(0.000)	(0.000)	(0.000)
product effects = 1		0.808***	0.411***	0.546*	0.461+
		(0.060)	(0.090)	(0.230)	(0.266)
logged dep. var. = 1		0.765***	0.352***	0.348	0.550
		(0.105)	(0.081)	(0.374)	(0.468)
country effects = 1		0.0434	-0.240**	0.0445	0.109
		(0.058)	(0.084)	(0.376)	(0.404)
published = 1		0.102+	0.0118	-0.0237	-0.0238
		(0.057)	(0.013)	(0.021)	(0.021)
N (in logs)			-0.00595	0.00225	0.00144
			(0.008)	(0.019)	(0.020)
no. of years (logs)			-0.376***	-0.376	-0.493
			(0.092)	(0.437)	(0.463)
no. of countries (logs)			-0.00673	-0.0208	-0.0206
			(0.020)	(0.025)	(0.025)
annual = 1			1.088***	0.596	-0.352
			(0.149)	(0.751)	(2.206)
time effects = 1			0.00471	-0.00520	-0.00398
			(0.066)	(0.066)	(0.066)
cross section = 1			-3.174***	-2.110	-5.394
			(0.270)	(1.571)	(6.317)
other preferences included = 1			0.0534	-0.188	0.877
			(0.071)	(0.560)	(2.179)
gravity regression = 1			-0.371***	-0.532	0.538
			(0.092)	(0.352)	(2.077)
robust s.e. = 1			0.0393	0.00844	0.00898
			(0.030)	(0.030)	(0.030)
single country analysis			1.195***	0.491	-0.416
			(0.147)	(0.719)	(2.205)
Agriculture				-0.00833	-0.00803
				(0.012)	(0.012)
All/Total				0.398	0.668
				(0.402)	(0.554)
Apparel/Textiles/Leather				0.0379	0.0387
				(0.089)	(0.089)
Energy/Electricity/Chemicals				0.0364*	0.0360*
				(0.017)	(0.017)
region==AGOA countries				-0.383	-0.378
				(0.245)	(0.247)
y==Exports				0.354	-1.702
				(0.895)	(4.089)
y==Imports				1.002	0.119
				(0.640)	(2.073)
method==GMM/IV				1.005**	0.994**
				(0.345)	(0.348)

method==OLS/Time series				0.410***	0.419***
				(0.113)	(0.114)
disaggregation==6 digit and above				0.00468	-0.825
				(0.539)	(2.215)
disaggregation==below 6 digits				0.473	-0.441
				(0.506)	(2.079)
disaggregation==Sector totals				0.345	0.620
				(0.392)	(0.551)
Constant	2.228	0.642	-0.214	-0.435	-0.363
	(2.822)	(1.068)	(0.822)	(1.216)	(1.232)
$\ln \sigma_u$: Random					
Constant	1.870***	1.135***	1.083***	1.395***	1.400***
	(0.414)	(0.277)	(0.214)	(0.231)	(0.236)
$\ln \sigma_e$: Residual					
Constant	3.249***	1.916***	0.375***	0.301***	0.305***
	(0.055)	(0.057)	(0.059)	(0.062)	(0.062)
Observations	173	173	173	173	171
LR test vs. linear regression	3.582	17.00	136.5	65.22	61.47
variance partition component (%)	6	17.3	80.5	17.3	17.3

Standard errors in parentheses. All variables divided by the standard error of the study's coefficient. Columns (1) – (4) exclude coefficients larger than 50 while Column (5) excludes studies with a single coefficient in addition to those with coefficients above 50.
$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix B

Appendix to Chapter Three

In providing further evidence on the various preferences of the USA, figures (B.1 – B.5) in this appendix provide more information. The main evidence presented shows that much of the CBTPA exports have been driven by the six CAFTA-DR countries that were initially members of the CBTPA. The exclusion of the six countries shows that the exports of the remaining CBTPA and AGOA countries are roughly similar. In figure B.1), total imports of the USA from AGOA beneficiaries increases while that of the CBTPA countries fall. However, the earlier graph (figure 3.1) showed that in terms of preferential exports AGOA is much higher. It is important to note that unlike AGOA countries, CBTPA countries have the CBI programme in addition to the CBERA programme. Haiti also has the HOPE preference programme in addition. Thus, summing up all the exports of these countries under the multiple preferential programmes and MFN exports does increase the level of their exports beyond that of the AGOA countries. This makes figure (B.1) less surprising—as the total exports of the CBTPA countries are much higher than the AGOA countries. One implication alluded to earlier in the discussion above becomes much clearer in the figure. The exclusion of the CAFTA-DR countries shows a much closer level of exports between the AGOA and CBTPA countries. The second panel which includes CAFTA-DR countries for the period they were CBTPA members shows that they contributed a big chunk in the CBTPA exports. It is these subtle differences that the author intends to address before arriving at a conclusive impact of AGOA on its beneficiaries. The key here is that, one should not only be interested in AGOA preferential exports but also what is happening to total exports to the USA as well as other destinations. Secondly, competing preferences offered by the same country to its partners can affect the competitiveness of other preferential exports.

Figure (B.2) shows the shares of the various preferences in total imports from each beneficiary. There is a marked increase in preferential shares and this is above 40% for the three groups. Also noticeable is the relatively small GSP share which is less than 10% and close to zero for CAFTA-DR[1]. Figure (B.5) indicates that AGOA exports is dominated by the extractive industry and their exports of this industry far exceeds those of the CBTPA countries. On the other hand, the CBTPA countries have textile, apparel, leather and footwear products dominating their exports. However, AGOA countries do tend to export visible levels of some of the other products. Last but not the least, table (B.1) shows the shares of the top AGOA and CBTPA exporters to the USA and EU. Chad has experienced a large increase in its shares to the USA and seen a corresponding decline in its EU export share. The CBI countries have exports to the USA dominating their export share to the EU. Finally, table (B.2) provides the shares of each preference in total American imports. Imports that claimed no preference account for 75% – 82% of American imports.

We now briefly discuss the results presented in Appendix II. The results presented here include

[1]Given that a free trade agreement (FTA) is in effect they do not export under the GSP and previous preferences. The preferential share actually represents exports under the FTA. Products not covered by the FTA are what did not claim any preferences.

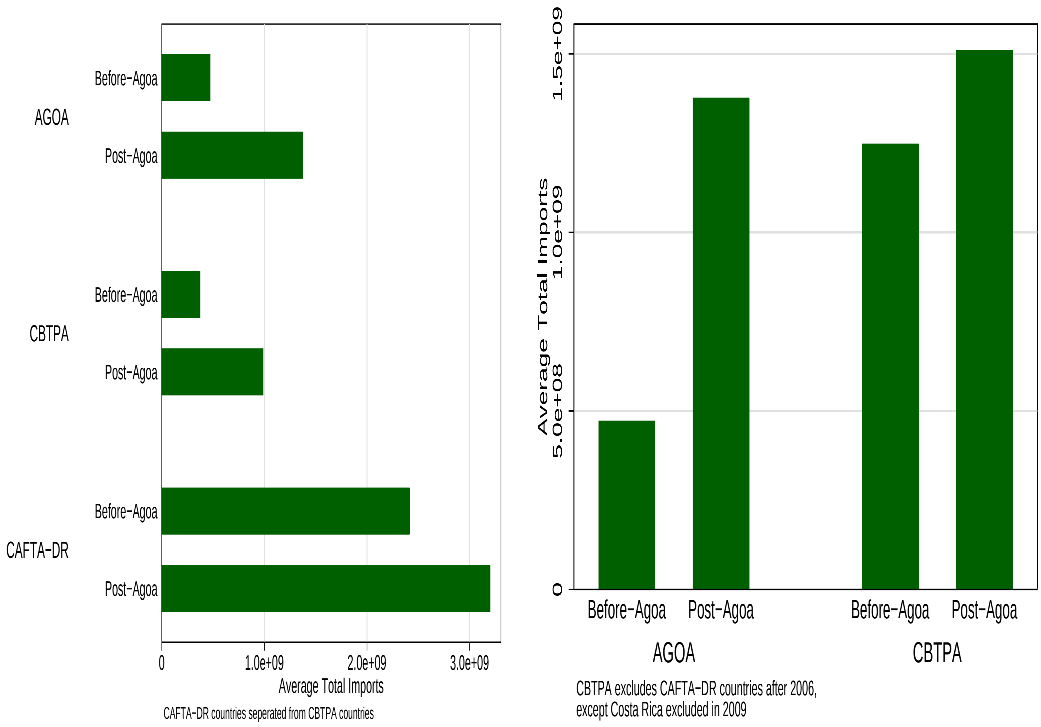
HS-2 and HS-4 digit results. What is striking in Table (B.4) is the sign reversal for the HS-4 digit estimates of AGOA as well as similar sign reversals for CBTPA for HS-2 and HS-4 digit estimations. In terms of the AGOA coefficient this is insignificant in the HS-4 digit column. A possible explanation might be the difficulty in accurately determining the fraction of exports in that category exported under the preference. Nevertheless, we notice that the correlation among the regressors increase at more disaggregated levels and is more severe in the non apparel and textile regressions. Much of this correlation is due to the preference-time interactions and the CBTPA preference included in the regressions. The HS-6 results are repeated in the tables for comparative purposes. In Table (B.4), the impact of a country's previous competitiveness has a larger effect at the 6-digit level compared to the more aggregated 2- and 4-digit levels. Market size of the USA relative to the world becomes negative at the other levels of disaggregation and also becomes insignificant (except at the 2-digit level where it is marginally significant at 10%). the positive sign recorded for the 6-digit level of disaggregation is significant at the 0.1% but the effect is small. The negative coefficient for the 2- and 4-digit levels probably indicates that at higher levels of aggregation the rest of the world tends to provide a larger market relative to the USA. The AGOA preferences are negative and insignificant in the 4-digit columns. They are however, significant in the 2-digit regressions in columns (2) and (5). The coefficients are larger accounting for the aggregated nature of the data. The GSP dummy is insignificant in both the 2-digit and 4-digit regressions—this might be due to the fact that countries are graduated or de-graduated in products at the 10–12 digit level and not at higher levels of aggregation. This makes it plausible to pick up a number of the tariff effects at the 6 digit level rather than at the 2–4 digit and more aggregated levels. On the contrary, the CBTPA dummy is negative and significant in the 4-digit regressions but insignificant in the 2-digit regressions.

The next two tables present results of the non apparel and textile and apparel and textile products separately. Table (B.5) reports the fixed effects estimates while Table (B.6) reports the Mundlak corrected random effects estimates. The two tables report similar estimates for our variables of interest. The AGOA coefficient is significant and positive in both tables at the 6-digit level for non apparel products. However, in Table (B.5) significance is at the 10% level and the coefficients of 0.017 and 0.036 (in Table (B.6) yield relatively small impacts of 1.71% and 3.71% respectively. This significance was obtained after including the time-preference interactions. The inclusion of the time-preference interactions also led to the exclusion of the CBTPA coefficients. The exclusion of the time-preference dummies leads to a negative coefficient for AGOA in the 6-digit level regressions. This compared to the apparel impact is relatively small in size. The inability to estimate a coefficient for the CBTPA preference prevents us from making any comments about the impact of the preference. The 2- and 4-digit results are insignificant for the GSP and AGOA preferences. The evidence thus far points to AGOA being more favourable to apparel and textile products. In Table (B.6) all three regressions for the apparel and textile products yield coefficients for all three preferences. At the 6-digit level AGOA, CBTPA and GSP product dummies do lead to higher exports to the USA relative to the rest of the world and are significant. At the 2-digit level the signs became negative for the GSP and CBTPA preferences but remain positive and larger for AGOA. The 4-digit level estimates of AGOA are no longer significant. The estimates for CBTPA and GSP are significant and negative. These results so far show that care must be taken in choosing a level of disaggregation when analysing trade data. The 2-digit and 6-digit levels of disaggregation tend to provide coefficients with the same sign compared to the 4-digit level coefficients. In addition, the apparel and textile products seem to be the driving force behind the performance of the AGOA and CBTPA preferences in our regressions.

Tables (B.7) and (B.8) carry out the Heckman selection and *Poisson PMLE* regressions respectively. The results are qualitatively similar to those reported in Table (B.4). Table (B.9) summarises the impact of the preferences across all five tables. The large impact of AGOA at the 2-digit level is the most noticeable feature of the table. This large impact might be due to problems present in the regressions as result of the aggregation of the six-digit trade data. However, the remaining preferences do not present such outliers in the impact of the preferences.

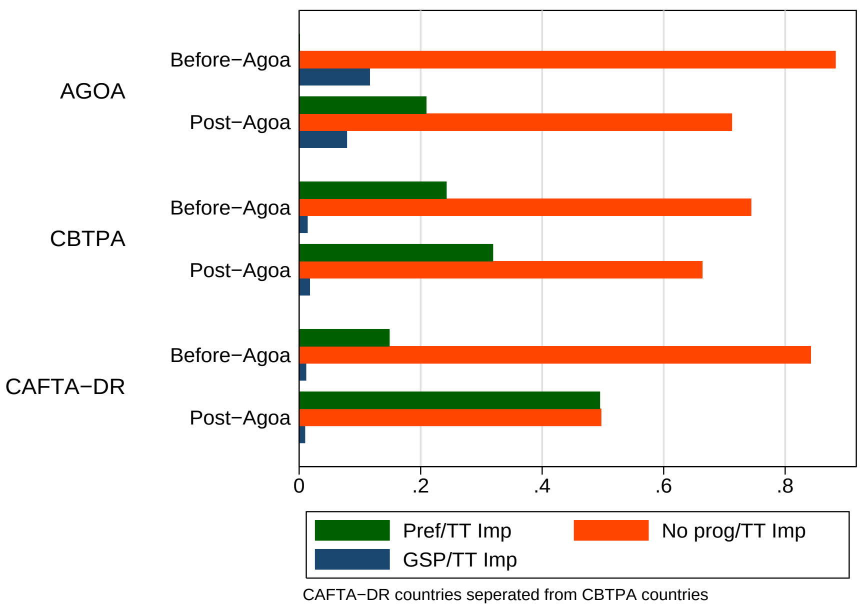
Table B.1: Share of exports to EU and USA in total exports

Top 5 AGOA countries					Top 4 CBI countries				
isocode	country	year	EU (%)	USA(%)	isocode	country	year	EU (%)	USA (%)
AGO	Angola	2000	14.7	39.2	BHS	Bahamas, The	2000	38.3	18.9
AGO	Angola	2001	21.1	38.3	BHS	Bahamas, The	2001	33.7	18.5
AGO	Angola	2002	21.2	32.5	BHS	Bahamas, The	2002	30.0	24.2
AGO	Angola	2003	12.1	42.5	BHS	Bahamas, The	2003	29.5	22.0
AGO	Angola	2004	8.7	34.3	BHS	Bahamas, The	2004	30.7	25.8
AGO	Angola	2005	12.9	34.9	BHS	Bahamas, The	2005	34.4	18.4
AGO	Angola	2006	7.8	35.0	BHS	Bahamas, The	2006	35.8	12.9
AGO	Angola	2007	12.1	27.3	BHS	Bahamas, The	2007	28.2	16.3
AGO	Angola	2008	14.4	24.7	BHS	Bahamas, The	2008	23.2	16.7
AGO	Angola	2009	14.6	20.8	BHS	Bahamas, The	2009	18.7	28.3
AGO	Angola	2010	8.7	21.0	BHS	Bahamas, The	2010	18.7	21.4
AGO	Angola	2011	13.9	20.7	BHS	Bahamas, The	2011	13.4	24.4
COG	Congo, Rep.	2000	9.7	15.6	HTI	Haiti	2000	5.5	85.5
COG	Congo, Rep.	2001	13.0	18.6	HTI	Haiti	2001	5.2	83.1
COG	Congo, Rep.	2002	17.6	7.8	HTI	Haiti	2002	4.5	86.0
COG	Congo, Rep.	2003	12.0	14.8	HTI	Haiti	2003	4.0	86.1
COG	Congo, Rep.	2004	7.1	19.6	HTI	Haiti	2004	3.6	81.6
COG	Congo, Rep.	2005	5.5	25.4	HTI	Haiti	2005	3.6	80.7
COG	Congo, Rep.	2006	4.9	31.9	HTI	Haiti	2006	4.2	76.1
COG	Congo, Rep.	2007	4.9	36.6	HTI	Haiti	2007	5.7	71.1
COG	Congo, Rep.	2008	7.5	37.8	HTI	Haiti	2008	6.0	66.4
COG	Congo, Rep.	2009	11.5	37.7	HTI	Haiti	2009	3.8	82.3
COG	Congo, Rep.	2010	15.3	26.3	HTI	Haiti	2010	4.7	77.5
COG	Congo, Rep.	2011	21.0	18.6	HTI	Haiti	2011	2.9	84.3
NGA	Nigeria	2000	20.2	37.9	JAM	Jamaica	2000	23.2	32.0
NGA	Nigeria	2001	22.0	34.8	JAM	Jamaica	2001	24.1	23.4
NGA	Nigeria	2002	21.7	28.5	JAM	Jamaica	2002	24.9	21.7
NGA	Nigeria	2003	21.8	34.1	JAM	Jamaica	2003	28.1	23.0
NGA	Nigeria	2004	15.7	41.3	JAM	Jamaica	2004	30.8	13.5
NGA	Nigeria	2005	18.2	43.9	JAM	Jamaica	2005	33.3	14.7
NGA	Nigeria	2006	18.1	38.6	JAM	Jamaica	2006	20.4	19.4
NGA	Nigeria	2007	16.6	40.0	JAM	Jamaica	2007	22.7	25.7
NGA	Nigeria	2008	19.8	34.3	JAM	Jamaica	2008	24.6	22.6
NGA	Nigeria	2009	21.0	28.5	JAM	Jamaica	2009	17.9	30.6
NGA	Nigeria	2010	19.3	31.1	JAM	Jamaica	2010	13.8	29.4
NGA	Nigeria	2011	29.4	30.0	JAM	Jamaica	2011	19.4	36.7
TCD	Chad	2000	40.8	3.2	TTO	Trinidad and Tobago	2000	10.0	51.2
TCD	Chad	2001	42.3	4.2	TTO	Trinidad and Tobago	2001	9.2	55.0
TCD	Chad	2002	40.5	5.5	TTO	Trinidad and Tobago	2002	9.6	53.6
TCD	Chad	2003	34.7	16.4	TTO	Trinidad and Tobago	2003	6.9	62.6
TCD	Chad	2004	17.1	49.4	TTO	Trinidad and Tobago	2004	6.5	67.9
TCD	Chad	2005	10.1	65.4	TTO	Trinidad and Tobago	2005	5.0	65.7
TCD	Chad	2006	1.7	79.0	TTO	Trinidad and Tobago	2006	10.8	56.7
TCD	Chad	2007	1.6	87.6	TTO	Trinidad and Tobago	2007	8.7	56.0
TCD	Chad	2008	2.5	86.3	TTO	Trinidad and Tobago	2008	16.4	39.5
TCD	Chad	2009	6.7	83.8	TTO	Trinidad and Tobago	2009	17.6	37.2
TCD	Chad	2010	8.5	62.4	TTO	Trinidad and Tobago	2010	13.2	41.6
TCD	Chad	2011	7.2	78.5	TTO	Trinidad and Tobago	2011	13.2	43.9
ZAF	South Africa	2000	27.3	8.8					
ZAF	South Africa	2001	28.0	8.8					
ZAF	South Africa	2002	26.7	7.9					
ZAF	South Africa	2003	27.5	7.7					
ZAF	South Africa	2004	25.4	8.0					
ZAF	South Africa	2005	25.2	7.3					
ZAF	South Africa	2006	24.8	8.3					
ZAF	South Africa	2007	24.6	8.0					
ZAF	South Africa	2008	23.6	7.3					
ZAF	South Africa	2009	22.0	6.4					
ZAF	South Africa	2010	19.8	7.1					
ZAF	South Africa	2011	19.3	7.7					



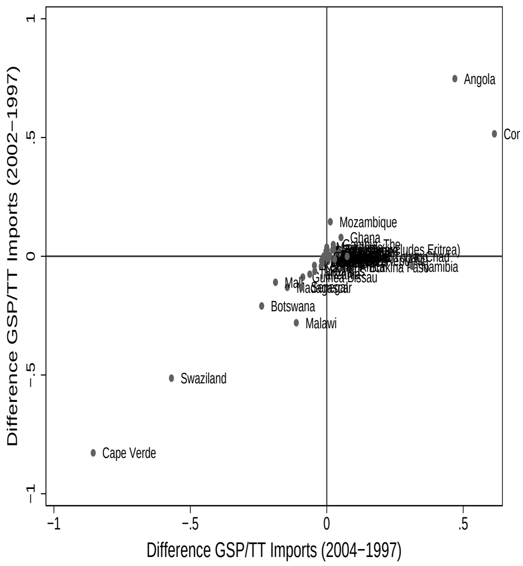
USA Imports from 26 *agoa*, 8 *cbtpa* and 6 *caft-dr* countries. Source: USITC data

Figure B.1: USA imports from *AGOA* and *CBTPA* countries

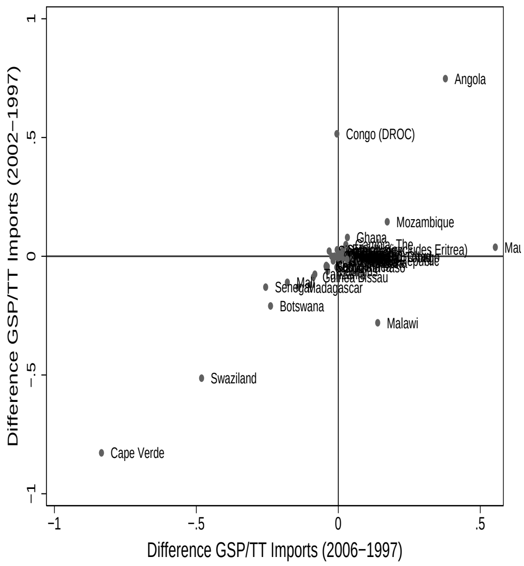


USA Import shares – 26 *agoa*, 8 *cbtpa* and 6 *caft-dr* countries. Source: Calculations based on USITC data

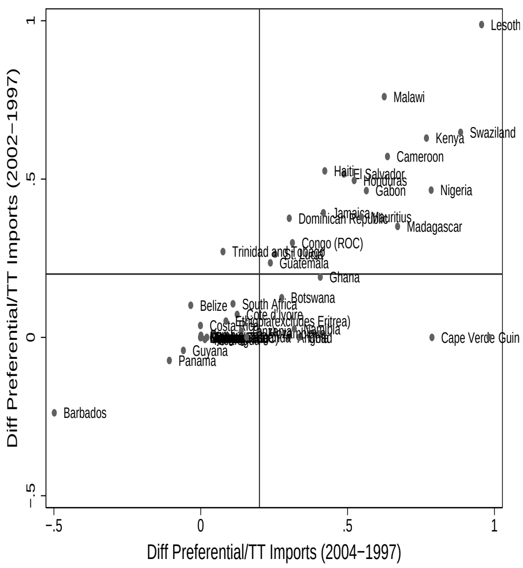
Figure B.2: USA import shares from *AGOA* and *CBTPA* countries



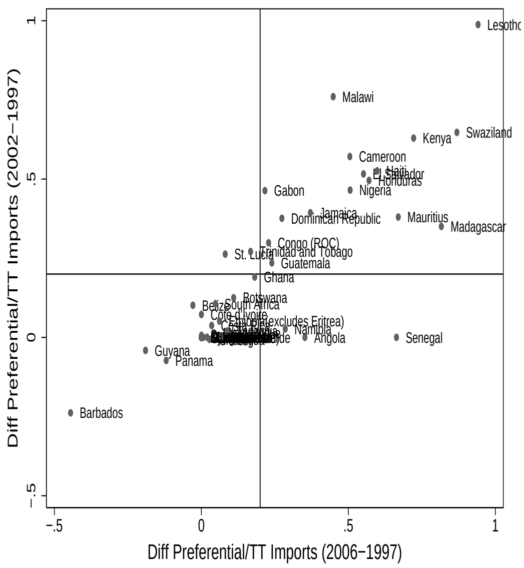
(a) GSP



(b) GSP



(c) AGOA/CBI Preference



(d) AGOA/CBI Preference

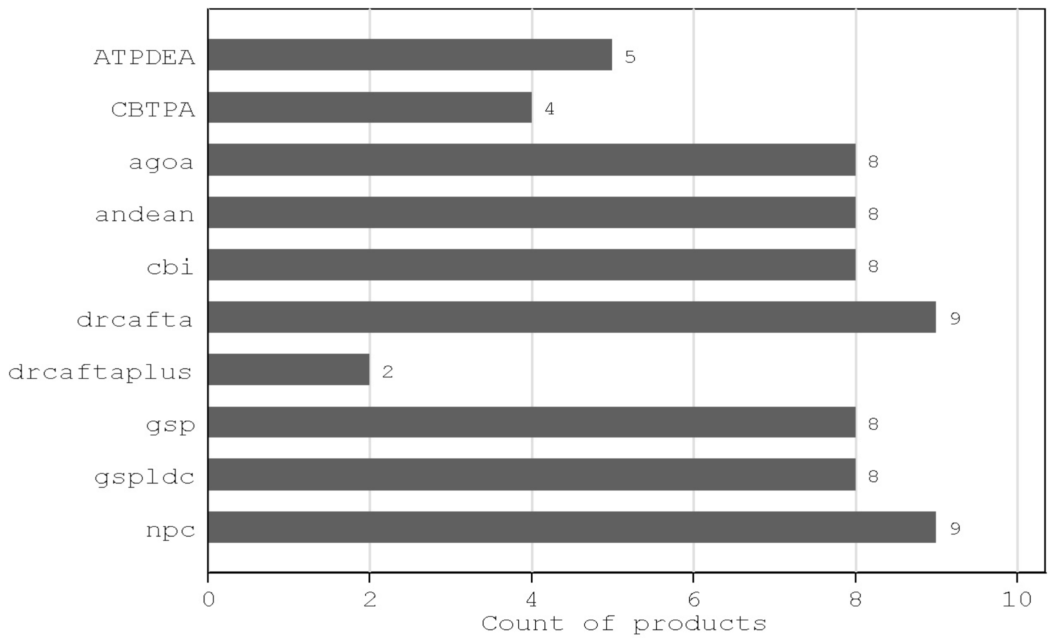
Comparing the difference in import shares for GSP preferences (26 AGOA & 14 CBTPA countries). Source: Calculations based on USITC data

Figure B.3: Differences in import shares for *AGOA* and *CBTPA* countries

Table B.2: Shares of Major USA preferences for developing countries

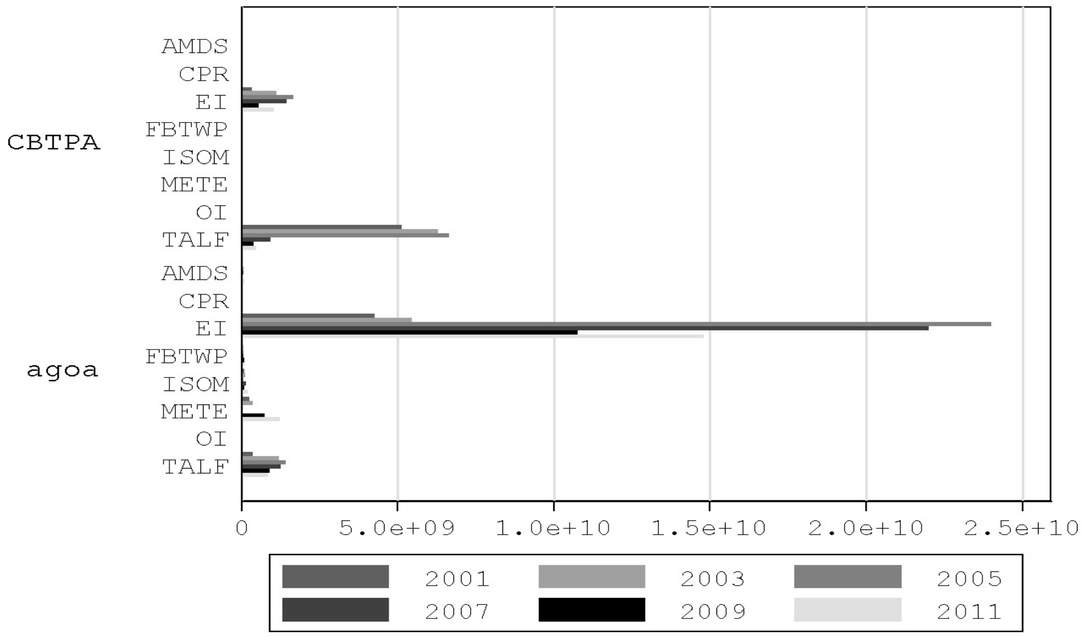
year	ATPDEA	CBTPA	AGOA	ANDEAN	CBI	CAFTA-DR	CAFTA-DR+	GSP	GSP LDC	NPC
1997	N/A	N/A	N/A	0.0015548	0.0037044	N/A	N/A	0.0169584	0.000452	0.7602999
1998	N/A	N/A	N/A	0.0018047	0.0034924	N/A	N/A	0.0159034	0.0012658	0.7538615
1999	N/A	N/A	N/A	0.0017073	0.0025406	N/A	N/A	0.0111965	0.0009592	0.7855813
2000	N/A	0.0001306	N/A	0.0016286	0.0021448	N/A	N/A	0.0108667	0.0013964	0.8003233
2001	N/A	0.0048038	0.0044017	0.00145	0.0023563	N/A	N/A	0.0112773	0.0026178	0.7844836
2002	0.0001527	0.0060463	0.0042284	0.0006532	0.0025063	N/A	N/A	0.0121787	0.0028114	0.7803383
2003	0.0032393	0.0059018	0.0057933	0.0012491	0.0023398	N/A	N/A	0.0130564	0.0036888	0.7822548
2004	0.0034376	0.0053366	0.0126301	0.0021086	0.0019529	N/A	N/A	0.0125436	0.0025905	0.7873375
2005	0.003863	0.004999	0.0153792	0.0025431	0.0020328	N/A	N/A	0.0124489	0.0033536	0.7869934
2006	0.0036209	0.0028789	0.0114357	0.0023678	0.0021025	0.0021131	4.70e-06	0.0127559	0.0043001	0.7891749
2007	0.0033942	0.0012239	0.0121277	0.0020502	0.0014463	0.0041289	0.000023	0.0111287	0.0042515	0.7986363
2008	0.0047783	0.0005641	0.0133328	0.0014177	0.0014387	0.0044163	0.0000243	0.0097868	0.0018926	0.8121335
2009	0.002736	0.0006059	0.0081758	0.0010563	0.0006917	0.0056874	0.0000401	0.0087492	0.000849	0.8172088
2010	0.0026954	0.0007784	0.0080405	0.0007553	0.0006374	0.00538	0.0000514	0.0088806	0.0007931	0.8144609
2011	0.0006382	0.0006798	0.0078804	0.0001896	0.0007881	0.0053025	0.0000469	0.0081206	0.0000541	0.8230368

N/A implies that the preference was not in effect in that year. NPC: No programme claimed i.e. existing exporters did not use any of the USA programmes available. Apart from CAFTA-DR and CAFTA-DR+, all the other programmes listed in the table are non-reciprocal preferences. CAFTA-DR and CAFTA-DR+ are free trade agreements signed in 2006 with Central American countries and the Dominican Republic. These are included for comparative purposes since their members were key members of the CBI and CBTPA preference programmes. There are other free trade programmes and agreements such as the Australia, Bahrain, Chile, Israel, Jordan, Korea, Marshall Islands, Morocco, Oman, Peru, Puerto-Rico, Singapore individual free trade agreements, North American Free Trade Agreement, Auto pact, Dyes, and Pharmaceuticals programmes. All these excluded programmes account for less than 23% of USA imports from the World. Source: Calculations based on USITC data



Product groups included here are the eight groups defined in figure (B.5) below. The count should be eight products however, CAFTA-DR also exports UN special code HS 98 products while NPC exports UN special codes HS 98–99. NPC–No programme claimed, i.e. imports did not arrive under any of the preferential programmes provided by the USA. Source: Calculations based on USITC data

Figure B.4: Count of products imported under various preferential programmes



AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97). Source: Calculations based on USITC data

Figure B.5: Imports from CBTPA & AGOA countries by product group

Table B.3: List of Countries

Afghanistan	Denmark	Lesotho	Russian Federation
Albania	Dominica	Liberia	San Marino
Antigua and Barbuda	Dominican Republic	Lithuania	Saudi Arabia
Argentina	Ecuador	Luxembourg	Senegal
Armenia	Egypt, Arab Rep.	Macao	Sierra Leone
Aruba	El Salvador	Macedonia, FYR	Singapore
Australia	Estonia	Madagascar	Slovak Republic
Austria	Ethiopia(excludes Eritrea)	Malawi	Slovenia
Azerbaijan	Fiji	Malaysia	South Africa
Bahamas, The	Finland	Maldives	Spain
Bahrain	France	Mali	Sri Lanka
Bangladesh	French Polynesia	Malta	St. Kitts and Nevis
Barbados	Gambia, The	Mauritania	St. Lucia
Belarus	Georgia	Mauritius	St. Vincent and the Grenadines
Belgium	Germany	Mexico	Suriname
Belize	Ghana	Micronesia, Fed. Sts.	Swaziland
Benin	Greece	Moldova	Sweden
Bermuda	Guatemala	Mongolia	Switzerland
Bhutan	Guinea	Morocco	Syrian Arab Republic
Bolivia	Guyana	Mozambique	Taiwan, China
Bosnia and Herzegovina	Haiti	Myanmar	Tajikistan
Botswana	Honduras	Namibia	Tanzania
Brazil	Hong Kong, China	Nepal	Thailand
British Virgin Islands	Hungary	Netherlands	Togo
Brunei	Iceland	Netherlands Antilles	Tokelau
Bulgaria	India	New Caledonia	Trinidad and Tobago
Burkina Faso	Indonesia	New Zealand	Tunisia
Cambodia	Iran, Islamic Rep.	Nicaragua	Turkey
Cameroon	Ireland	Niger	Turkmenistan
Canada	Israel	Nigeria	Uganda
Cape Verde	Italy	Norway	Ukraine
Cayman Islands	Jamaica	Oman	United Arab Emirates
Chile	Japan	Pakistan	United Kingdom
China	Jordan	Palau	Uruguay
Colombia	Kazakhstan	Panama	Uzbekistan
Congo, Dem. Rep.	Kenya	Paraguay	Venezuela
Cook Islands	Korea, Rep.	Peru	Vietnam
Costa Rica	Kuwait	Philippines	Yemen
Cote d'Ivoire	Kyrgyz Republic	Poland	Zambia
Croatia	Lao PDR	Portugal	Zimbabwe
Cyprus	Latvia	Qatar	
Czech Republic	Lebanon	Romania	

Table B.4: Fixed/Random effects regression without selection correction

	All			Mundlack corrected RE		
	(1)	(2)	(3)	(4)	(5)	(6)
	FE-HS6	FE-HS2	FE-HS4	RE-HS6	RE-HS2	RE-HS4
AGOA product dummy	0.384**	3.224*	-0.105	0.416**	3.400*	-0.015
	(0.135)	(1.440)	(0.242)	(0.136)	(1.443)	(0.238)
agoa×gsp product dummy	0.429	-145.135*	0.730	0.022	-157.399**	0.571
	(0.477)	(56.855)	(0.632)	(0.564)	(57.505)	(0.607)
CBTPA product dummy	0.367**	-0.446	-1.048***	0.395***	-0.364	-1.027***
	(0.113)	(0.411)	(0.193)	(0.113)	(0.403)	(0.192)
cbtpa×gsp product dummy	-1.115	-5.249	-0.436	-1.561*	-16.603	-0.934
	(0.914)	(39.091)	(1.447)	(0.617)	(38.142)	(1.404)
GSP product dummy	0.113**	0.219	-0.122	0.126**	0.228	-0.098
	(0.040)	(0.470)	(0.143)	(0.040)	(0.470)	(0.143)
CAFTA-DR	-0.242***	-0.233**	-0.620***	-0.222***	-0.231**	-0.602***
	(0.038)	(0.077)	(0.075)	(0.037)	(0.077)	(0.075)
Country's RCA, lagged (log)	0.100***	0.082***	0.080***	0.108***	0.082***	0.079***
	(0.005)	(0.020)	(0.010)	(0.005)	(0.020)	(0.010)
Market size, USA.World (logs)	0.008***	-0.040+	-0.004	0.010***	-0.039+	-0.003
	(0.001)	(0.021)	(0.010)	(0.001)	(0.021)	(0.010)
landlocked	‡	‡	‡	0.076***	†	0.621***
				(0.007)		(0.056)

Area (log)	‡	‡	‡	-0.015***	†	-0.127***
				(0.002)		(0.011)
Number of cities	‡	‡	‡	-0.005***	†	-0.017**
				(0.001)		(0.006)
latitude	‡	‡	‡	-0.002***	†	-0.006***
				(0.000)		(0.001)
English Speaking	‡	‡	‡	-0.029***	†	0.025
				(0.009)		(0.052)
Spanish speaking	‡	‡	‡	-0.156***	†	-0.890***
				(0.017)		(0.084)
Africa	‡	‡	‡	-0.041***	†	0.825***
				(0.007)		(0.069)
Latin America & Caribbean	‡	‡	‡	0.282***	†	1.591***
				(0.017)		(0.097)
NAFTA	‡	‡	‡	1.713***	†	0.859***
				(0.044)		(0.119)
Constant	0.196***	0.450***	0.739***	0.406***	0.928***	2.363***
	(0.005)	(0.035)	(0.024)	(0.024)	(0.182)	(0.135)
agoa×year$_i$	Yes	†	Yes	Yes	†	Yes
cbtpa×year$_j$	Yes	†	Yes	Yes	†	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak terms (averages)	No	No	No	Yes	Yes	Yes
Observations	1047124	20163	113997	1047124	20163	113997
Adjusted R^2	0.015	0.020	0.022			
Clusters	1.22e+05	1872	14029	1.22e+05	1872	14029
F-Test	72.853	5.004	18.316			
R-squared overall	0.001	0.000	0.003	0.155	0.201	0.179

Robust Standard errors in parentheses, $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Dependent variable is the log of (imports into the US/into rest of world) Estimation is done at 6 digits, 4 digits and 2 digits on positive flows F test of fixed effects for columns 1, 2, and 3 respectively: F-test(121776,925309) = 6.89 , F-test(1871,18270) = 23.55, F-test(14028,99930) = 17.12. † indicates variable dropped in estimation ‡ indicates not applicable. i = 2002, ... , 2009; j = 2001, ... , 2009

Table B.5: Fixed effects regression without selection correction-Non apparel and Apparel & Textiles

	Non Apparel			Apparel		
	(1)	(2)	(3)	(4)	(5)	(6)
	HS6	HS2	HS4	HS6	HS2	HS4
AGOA product dummy	0.017*	-0.079	-0.281	0.380**	3.287*	-0.128
	(0.008)	(1.042)	(0.266)	(0.136)	(1.456)	(0.242)
agoa×gsp product dummy	-0.118+	†	†	0.510	-150.157*	1.897
	(0.068)			(0.507)	(60.564)	(1.282)
CBTPA product dummy	†	†	†	†	†	†
cbtpa×gsp product dummy	†	†	†	†	†	†
GSP product dummy	0.209+	0.430	0.391	0.102*	0.202	-0.247+
	(0.117)	(0.912)	(0.447)	(0.042)	(0.496)	(0.135)
CAFTA-DR	-0.139+	-0.294*	-0.442	-0.258***	-0.219*	-0.637***
	(0.078)	(0.145)	(0.410)	(0.042)	(0.086)	(0.074)
Country's RCA, lagged (log)	0.001	-0.026	-0.059	0.116***	0.092***	0.093***
	(0.007)	(0.064)	(0.039)	(0.006)	(0.021)	(0.010)
Market size, USA.World (logs)	0.010***	0.148	0.109**	0.008***	-0.057**	-0.021*
	(0.002)	(0.098)	(0.039)	(0.001)	(0.018)	(0.009)
cbtpa×year interactions	†	†	†	†	†	†
Constant	0.139***	0.304**	0.657***	0.206***	0.485***	0.783***
	(0.009)	(0.093)	(0.060)	(0.005)	(0.032)	(0.022)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	139290	2685	12335	907834	17478	101662
R^2	0.002	0.013	0.010	0.016	0.029	0.027
Adjusted R^2	0.002	0.007	0.009	0.016	0.028	0.027
Clusters	18551	225	1844	1.03e+05	1647	12185
F-Test	.	.	.	71.793	4.983	19.082

Robust standard errors in parentheses, $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Dependent variable is the log of (imports into the US/into rest of world). Estimation is done at 6 digits, 4 digits and 2 digits on positive flows Non apparel: HS 01, 02, 25 & 26 Apparel and Textiles: HS50 - 63 F test of fixed effects for columns 1-6 respectively: F-test(18550,120718) = 8.6 , F-test(224,2442) = 29.83, F-test(1843,10472) = 16.93, F-test(103225,804570) = 6.78 , F-test(1646,15810) = 22.32, F-test(12184,89439) = 16.84. † indicates variable dropped in estimation, ‡ indicates not applicable

Table B.6: Random effects regression with Mundlak's correction-Non apparel and Apparel & Textiles

	Non Apparel			Apparel		
	(1)	(2)	(3)	(4)	(5)	(6)
	HS6	HS2	HS4	HS6	HS2	HS4
AGOA product dummy	0.036^{+}	-0.035	-0.288	0.409**	3.444*	-0.036
	(0.020)	(1.062)	(0.268)	(0.136)	(1.458)	(0.239)
agoa×gsp product dummy	-0.163*	†	†	0.090	-161.322**	1.587
	(0.076)			(0.597)	(61.106)	(1.253)
CBTPA product dummy	†	†	†	0.383***	-0.352	-1.008***
				(0.113)	(0.405)	(0.191)
cbtpa×gsp product dummy	†	†	†	-1.529*	-17.059	-0.896
				(0.618)	(38.388)	(1.391)
GSP product dummy	0.201^{+}	0.430	0.383	0.118**	0.211	-0.223^{+}
	(0.119)	(0.915)	(0.450)	(0.042)	(0.496)	(0.134)
CAFTA-DR	-0.105	-0.291*	-0.353	-0.240***	-0.218*	-0.622***
	(0.077)	(0.144)	(0.404)	(0.041)	(0.086)	(0.074)
Country's RCA, lagged (log)	0.002	-0.029	-0.049	0.126***	0.091***	0.091***
	(0.007)	(0.065)	(0.037)	(0.006)	(0.021)	(0.010)
Market size, USA.World (logs)	0.011***	0.149	0.111**	0.010***	-0.056**	-0.021*
	(0.001)	(0.099)	(0.038)	(0.001)	(0.018)	(0.009)
landlocked	-0.031***	†	-0.040	0.094***	†	0.682***
	(0.009)		(0.226)	(0.008)		(0.058)
Area (log)	0.002	†	-0.162***	-0.017***	†	-0.128***
	(0.003)		(0.039)	(0.002)		(0.011)
Number of cities	0.005**	†	0.040^{+}	-0.006***	†	-0.021***
	(0.001)		(0.022)	(0.001)		(0.006)
latitude	0.001*	†	0.001	-0.003***	†	-0.007***
	(0.000)		(0.003)	(0.000)		(0.001)
English Speaking	0.070***	†	0.461**	-0.041***	†	-0.022
	(0.017)		(0.162)	(0.010)		(0.055)
Spanish speaking	-0.003	†	-0.149	-0.182***	†	-1.059***
	(0.045)		(0.243)	(0.018)		(0.087)
Africa	-0.036**	†	0.326	-0.042***	†	0.868***
	(0.012)		(0.199)	(0.008)		(0.072)
Latin America & Caribbean	0.262***	†	2.256***	0.287***	†	1.522***
	(0.044)		(0.326)	(0.018)		(0.099)
NAFTA	1.658***	†	-0.433	1.714***	†	1.083***
	(0.147)		(0.352)	(0.043)		(0.121)
Constant	-0.134**	0.637	1.154*	0.452***	0.963***	2.505***
	(0.041)	(0.544)	(0.526)	(0.026)	(0.189)	(0.138)
agoa×year_2002	†	†	†	Yes	†	Yes
cbtpa×year_2009	†	†	†	Yes	†	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak terms (averages)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	139290	2685	12335	907834	17478	101662
Clusters	18551	225	1844	1.03e+05	1647	12185
rho	0.407	0.671	0.773	0.408	0.795	0.773
R-squared overall	0.111	0.153	0.175	0.159	0.232	0.193

Robust Standard errors in parentheses, $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Dependent variable is the log of (imports into the US/into rest of world). Estimation is done at 6 digits, 4 digits and 2 digits on positive flows Non apparel: HS 01, 02, 25 & 26 Apparel and Textiles: HS50 - 63. † indicates variable dropped in estimation, ‡ indicates not applicable. i = 2002, ... , 2009; j = 2001, ... , 2009

Table B.7: Heckman selection estimates

	LPM-FE/Probit-RE and Fixed Effects 2nd stage						Mundlak corrected first stage and Fixed effects 2nd stage					
	LPM-FE		LPM-FE		Probit		LPM-RE		LPM-RE		Probit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	1st-HS6	2nd-HS6	1st-HS2	2nd-HS2	1st-HS4	2nd-HS4	1st-HS6	2nd-HS6	1st-HS2	2nd-HS2	1st-HS4	2nd-HS4
AGOA product dummy	‡	0.407**	‡	3.630*	‡	-0.069	‡	0.405**	‡	3.562*	‡	-0.060
		(0.134)		(1.473)		(0.241)		(0.134)		(1.470)		(0.246)
agoa×gsp product dummy	‡	0.395	‡	-146.076*	‡	0.691	‡	0.392	‡	-145.646*	‡	0.710
		(0.464)		(59.040)		(0.614)		(0.462)		(58.733)		(0.637)
CBTPA product dummy	‡	0.353**	‡	-0.325	‡	-1.017***	‡	0.359**	‡	-0.340	‡	-1.049***
		(0.112)		(0.404)		(0.193)		(0.112)		(0.405)		(0.193)
cbtpa×gsp product dummy	‡	-1.083	‡	-11.970	‡	-0.532	‡	-1.088	‡	-10.858	‡	-0.404
		(0.888)		(39.165)		(1.446)		(0.886)		(39.084)		(1.449)
GSP product dummy	‡	0.111**	‡	0.236	‡	-0.130	‡	0.109**	‡	0.222	‡	-0.115
		(0.040)		(0.468)		(0.143)		(0.040)		(0.469)		(0.142)
CAFTA-DR	‡	-0.265***	‡	-0.205**	‡	-0.700***	‡	-0.266***	‡	-0.211**	‡	-0.610***
		(0.038)		(0.077)		(0.078)		(0.038)		(0.077)		(0.076)
Country's RCA, lagged (log)	‡	0.000	‡	0.078***	‡	0.066***	‡	0.004	‡	0.079***	‡	0.084***
		(0.005)		(0.020)		(0.010)		(0.005)		(0.020)		(0.010)
Market size, USA.World (logs)	‡	0.009***	‡	-0.030	‡	-0.004	‡	0.009***	‡	-0.033	‡	-0.004
		(0.001)		(0.021)		(0.010)		(0.001)		(0.021)		(0.010)
GSP LDC country dummy	-0.013***	‡	-0.014**	‡	-0.110**	‡	-0.013***	‡	-0.014**	‡	0.412***	‡
	(0.001)		(0.005)		(0.039)		(0.001)		(0.005)		(0.060)	
GSP country dummy	-0.008***	‡	0.000	‡	-0.442***	‡	-0.008***	‡	0.000	‡	-0.197***	‡
	(0.001)		(0.004)		(0.021)		(0.001)		(0.004)		(0.024)	
CBI	0.039***	‡	0.023	‡	-0.663***	‡	0.039***	‡	0.023	‡	0.701***	‡
	(0.008)		(0.028)		(0.063)		(0.008)		(0.028)		(0.209)	
AGOA country dummy	-0.006***	‡	-0.021***	‡	-0.111**	‡	-0.006***	‡	-0.021***	‡	0.195***	‡
	(0.001)		(0.003)		(0.034)		(0.001)		(0.003)		(0.043)	
Country's RCA (log)	0.070***	‡	0.001***	‡	0.141***	‡	0.070***	‡	0.001***	‡	0.113***	‡
	(0.001)		(0.000)		(0.004)		(0.001)		(0.000)		(0.004)	
Military	-0.009***	‡	-0.010	‡	-0.423***	‡	-0.009***	‡	-0.010	‡	-0.135***	‡
	(0.001)		(0.007)		(0.030)		(0.001)		(0.007)		(0.037)	
Number of free lines	0.001	‡	-0.000	‡	-0.016***	‡	0.001	‡	-0.000	‡	-0.005	‡
	(0.001)		(0.000)		(0.003)		(0.001)		(0.000)		(0.003)	
Margin (MFN and applied tariff)	0.014***	‡	0.047***	‡	0.138***	‡	0.014***	‡	0.047***	‡	0.062^{+}	‡
	(0.001)		(0.014)		(0.033)		(0.001)		(0.014)		(0.038)	
1st stage Residuals/ *Inverse Mills ratio*	‡	-5.545***	‡	-8.705***	‡	-0.261***	‡	-5.964***	‡	-7.637***	‡	0.100
		(0.152)		(2.135)		(0.055)		(0.162)		(2.229)		(0.079)
Constant	0.141***	4.078***	0.126***	6.782***	-8.935***	1.697***	-0.133***	4.072***	-0.075**	5.662***	-8.573***	0.435^{+}
	(0.001)	(0.105)	(0.005)	(1.554)	(0.116)	(0.206)	(0.003)	(0.104)	(0.024)	(1.523)	(0.210)	(0.245)
agoa×year$_i$	‡	Yes	†	‡	‡	Yes	‡	Yes	‡	†	‡	Yes
cbtpa×year$_j$	‡	Yes	‡	†	‡	Yes	‡	Yes	‡	†	‡	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak terms (averages)	No	No	No	No	No	No	Yes	No	Yes	No	Yes	No
Observations	2279844	1047124	41832	20163	501984	113997	2279844	1047124	41832	20163	501984	113997
R^2	0.020	0.022	0.017	0.024		0.024		0.022		0.023		0.023
Adjusted R^2	0.020	0.022	0.017	0.023		0.023		0.022		0.022		0.022
Clusters	1.63e+05	1.22e+05	2988	1872		14029	1.63e+05	1.22e+05	2988	1872		14029
rho $\left(\rho = \sigma_u^2/(1+\sigma_u^2)\right)$	0.678	0.549	0.850	0.830	0.921	0.842	0.592	0.602	0.807	0.881	0.907	0.819
F-Test	483.580	84.726	7.623	5.073		18.068		85.133		4.968		18.080

.2 Standard errors in parentheses, $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors used for all non linear models. Dependent variable for 1st stage regressions is the probability of exporting to the USA. For the 2nd stage this is the log of (imports into the US/into rest of world). Columns (1), (3), & (9) use the linear probability model (LPM) for the 1st stage. Columns (5) & (11) are based on the panel probit random effects model. The second half of the table is augmented with the Mundlak averages and the LPM are based on the random effects model. Estimation in the second stage is done digits on positive flows. The error of the panel probit is decomposed into $\varepsilon_{it} = u_i + \nu_{it}$, where u_i is the random effect component and ν_{it} is the iid error. When $\rho = 0$, then the pooled effects probit is no longer different from the panel probit. † indicates variable dropped in estimation, ‡ indicates not applicable. i = 2002, ... , 2009; j = 2001, ... , 2009.

Table B.8: Poisson FE Estimates

	(1) 1-HS6	(2) 2-HS6	(3) 3-HS6	(4) 3-HS2	(5) 1-HS4
US/World Import ratio					
AGOA product dummy	-0.263	0.972***	1.230***	28.248**	-0.163
	(9132.504)	(0.008)	(0.008)	(8.629)	(105.378)
agoa×gsp product dummy	0.448	2.889***	2.139***	-422.761	†
	(9132.032)	(0.142)	(0.142)	(993.389)	
GSP product dummy	1.176***	-1.601***	-0.873***	-81.923***	1.549***
	(0.023)	(0.015)	(0.011)	(8.359)	(0.025)
CAFTA-DR	-0.362***	-0.853***	-1.147***	4.190***	-0.127***
	(0.007)	(0.006)	(0.004)	(0.048)	(0.008)
Country's RCA, lagged (log)	-0.379***	0.411***	0.298***	-0.270***	-0.498***
	(0.001)	(0.001)	(0.000)	(0.003)	(0.001)
Market size, USA.World (logs)	0.256***	0.133***	0.260***	-1.374***	0.583***
	(0.000)	(0.001)	(0.000)	(0.021)	(0.001)
agoa×year_2002	-0.500	0.320***	0.290***	†	-0.050
	(167.738)	(0.010)	(0.010)		(167.738)
agoa×year_2003	-2.085	1.047***	0.985***	†	†
	(24768.914)	(0.008)	(0.008)		
agoa×year_2008	-5.911	-0.108***	-1.455***	†	†
	(2.03e+05)	(0.011)	(0.010)		
agoa×year_2009	-3.930	-0.778***	-0.968***	†	†
	(2.03e+05)	(0.012)	(0.012)		
Year effects	Yes	Yes	Yes	Yes	Yes
Observations	259714	1445164	1704878	26208	25830
log likelihood	-6.77e+06	-8.77e+06	-1.67e+07	-7.18e+04	-1.56e+06
Chi-squared	3.88e+06	1.68e+06	3.54e+06	1.35e+05	1.82e+06

Standard errors in parentheses, $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Estimation is done at 6 digits and 2 digits - 1=Non apparel: HS 01, 02, 25 & 26; 2=Apparel and Textiles: HS50 - 63 3=Full: combines all 6 (2) digit products for both apparel and non apparel in our sample. † indicates variable dropped in estimation, ‡ indicates not applicable. CBTPA product dummy, cbtpa×gsp product dummy and cbtpa×year$_j$ got dropped from the model.

Table B.9: Summary impact of preferences estimated in Tables B.4 – B.7 in percent

	GSP	AGOA	CBTPA	CAFTA-DR
Table B.4				
2 digit (FE)	24.49	2411.77	-36.00	-20.78
4 digit (FE)	-11.44	-9.92	-64.94	-46.18
6 digit (FE)	12.00	46.84	44.38	-21.52
2 digit (Mundlak)	25.56	2895.24	-30.51	-20.60
4 digit (Mundlak)	-9.36	-1.50	-64.18	-45.21
6 digit (Mundlak)	13.39	51.57	48.37	-19.88
Table B.5				
2 digit (Non Apparel)	53.76	-7.56	†	-25.51
4 digit (Non Apparel)	47.89	-24.53	†	-35.72
6 digit (Non Apparel)	23.29	1.71	†	-12.98
2 digit (Apparel)	22.40	2575.05	-34.99	-19.66
4 digit (Apparel)	-21.92	-12.04	-64.38	-47.11
6 digit (Apparel)	10.69	46.20	42.86	-22.72
Table B.6				
2 digit (Non Apparel)	53.76	-3.48	†	-25.27
4 digit (Non Apparel)	46.66	-25.01	†	-29.73
6 digit (Non Apparel)	22.23	3.71	†	-9.95
2 digit (Apparel)	23.47	3030.98	-29.67	-19.55
4 digit (Apparel)	-20.00	-3.55	-63.50	-46.31
6 digit (Apparel)	12.49	50.58	46.62	-21.36
Table B.7				
2 digit (Column 4)	26.59	3670.83	-27.75	-18.56
4 digit (Column 6)	-12.22	-6.66	-63.82	-50.34
6 digit (Column 2)	11.69	50.25	42.32	-23.30
2 digit (Column 10: Mundlak)	24.91	3424.60	-28.82	-19.02
4 digit (Column 12: Mundlak)	-10.87	-5.87	-64.95	-45.66
6 digit (Column 8: Mundlak)	11.55	49.94	43.17	-23.32

Calculated as $(\exp^{\beta} - 1) \times 100$. † implies coefficient was dropped by the software.

Appendix C

Appendix to Chapter Four

Summary statistics

Table C.1: Summary Statistics - panel data

	count	p25	p50	p75	p95	mean	max
Treated Countries under common support							
Exports to USA	350	8564796	84170659	321903577	8.26e+09	1.35e+09	3.92e+10
Control Countries under common support							
Exports to USA	397	4044833	143788228	2.73e+09	2.21e+10	3.28e+09	3.69e+10
All Countries including countries not under common support							
Exports to USA	1096	6247868	131920578	1.94e+09	1.47e+10	2.46e+09	5.25e+10

Table C.2: Summary Statistics - Other variables

	count	mean	min	max
Mirror Exports Share-USA	1539	0.169	0.000000809	0.959
Area	1570	4.08e+05	10	8.51e+06
Real GDP	1278	5757.740	145.0	42188.809
Weighted distance	1570	9845.144	2387.8	16764.666
Landlocked	1580	0.139	0	1.000
Voice & Accountability	1370	42.241	0	97.000
Political Stability	1290	41.012	1.500	96.000
Government Effectiveness	1330	42.466	1.500	98.000
Regulatory Quality	1340	42.306	0	100.000
Rule of Law	1340	40.646	0	92.000
Corruption	1330	43.342	0	96.500
Adj. Saving per GNI	975	8.765	-167.5	89.299
GDP per capita	1256	3026.931	62.95	27169.707
AGOA Treatment	1650	0.212	0	1.000
Preference Type	490	1.286	1	2.000
Regions (acc. to World Bank)	1400	3.064	1	5.000
High Income (NonOECD) (HI)	1400	0.157	0	1.000
Low Income (LI)	1400	0.236	0	1.000
Lower Middle Income (LMI)	1400	0.343	0	1.000
Upper Middle Income (UMI)	1400	0.264	0	1.000
Majority Christian	1282	0.495	0	1.000
Majority Muslim	1282	0.303	0	1.000
Other Religion	1282	0.203	0	1.000
Observations	1650			

Export share and preferential import data is for 2001-2010 Data for controls based on data from 1985-1999 in most cases Data from WGI are based on averages for 1996 & 1998

Table C.3: List of countries used in analysis

AGOA (Treated)	CS	P	Non-AGOA (Control)	CS	P	Non-AGOA (Control)	CS	P	Non AGOA (Control)	CS	P
	CSup	CSup		CSup	CSup		OCSup	OCSup		OCSup	OCSup
Angola	✓	✓	Afghanistan	✓	✓	Anguila	✓		Indonesia	✓	✓
Botswana	✓	✓	Algeria	✓	✓	Antigua and Barbuda	✓		Iraq	✓	✓
Burkina Faso	✓	✓	Argentina	✓	✓	Aruba	✓		Jamaica	✓	✓
Cameroon	✓	✓	Bangladesh	✓	✓	Bahamas, The	✓		Kuwait	✓	
Cape Verde	✓	✓	Benin	✓	✓	Bahrain	✓		Macao	✓	
Chad	✓	✓	Bhutan	✓	✓	Barbados	✓		Malta	✓	
Congo, DR	✓	✓	Brazil	✓	✓	Belize	✓	✓	Marshall Is	✓	✓
Congo, Rep	✓	✓	Burundi	✓	✓	Bolivia	✓	✓	Martinique	✓	
Cote d'Ivoire	✓	✓	Cambodia	✓	✓	British Virgin Is.	✓		Mayotte	✓	
Djibouti	✓	✓	Central African Rep.	✓	✓	British Indian Overseas Territories	✓		Montserrat	✓	
Ethiopia (excludes Eritrea)	✓	✓	Chile	✓	✓	Brunei	✓		Nauru	✓	
Gabon	✓	✓	Comoro Is.	✓	✓	Burma (Myanmar)	✓		Netherlands Antilles	✓	
Gambia, The	✓	✓	Eritrea	✓	✓	Cayman Is	✓		New Caledonia	✓	
Ghana	✓	✓	India	✓	✓	Christmas Is	✓		Nicaragua	✓	✓
Guinea	✓	✓	Iran, Islamic Rep.	✓	✓	Cocos Is	✓		Niue	✓	
Guinea Bissau	✓	✓	Jordan	✓	✓	Colombia	✓	✓	Norfolk Is	✓	
Kenya	✓	✓	Kiribati	✓	✓	Cook Islands	✓		North Korea	✓	
Lesotho	✓	✓	Laos	✓	✓	Costa Rica	✓	✓	Oman	✓	
Madagascar	✓	✓	Lebanon	✓	✓	Cuba	✓	✓	Palau	✓	✓
Malawi	✓	✓	Liberia	✓	✓	Curacao	✓		Panama	✓	✓
Mali	✓	✓	Libya	✓	✓	Dominica	✓	✓	Paraguay	✓	✓
Mauritania	✓	✓	Malaysia	✓	✓	Dominican Republic	✓	✓	Pitcairn Is	✓	
Mauritius	✓	✓	Maldives	✓	✓	East Timor	✓		Qatar	✓	
Mozambique	✓	✓	Mongolia	✓	✓	Ecuador	✓	✓	Reunion	✓	
Namibia	✓	✓	Morocco	✓	✓	Egypt, Arab Rep.	✓	✓	Samoa	✓	✓
Niger	✓	✓	Nepal	✓	✓	El Salvador	✓	✓	Saudi Arabia	✓	
Nigeria	✓	✓	Papua New Guinea	✓	✓	Eq Guinea	✓		Seychelles	✓	✓
Rwanda	✓	✓	Pakistan	✓	✓	F St Micronesia	✓	✓	Singapore	✓	
Senegal	✓	✓	Peru	✓	✓	Falkland Is	✓		Sint Maarten	✓	
Sierra Leone	✓	✓	Philippines	✓	✓	Fiji	✓	✓	St Helena	✓	
South Africa	✓	✓	Sao Tome & Principe	✓	✓	Fr S & Ant land	✓		St Pierre & Miq	✓	
Swaziland	✓	✓	Solomon Is.	✓	✓	French Guiana	✓		St. Kitts and Nevis	✓	✓
Tanzania	✓	✓	Somalia	✓	✓	French Polynesia	✓		St. Lucia	✓	✓
Uganda	✓	✓	Sri Lanka	✓	✓	Grenada	✓	✓	St. Vincent and the Grenadines	✓	✓
Zambia	✓	✓	Togo	✓	✓	Guatemala	✓	✓	Suriname	✓	✓
			Tunisia	✓	✓	Guyana	✓	✓	Syrian Arab Republic	✓	✓
			Uruguay	✓	✓	Haiti	✓	✓	Taiwan, China	✓	
			Vietnam	✓	✓	Heard & McDonald Is.	✓		Tokelau Is	✓	
			Yemen	✓	✓	Honduras	✓	✓	Tonga	✓	✓
			Zimbabwe	✓	✓	Hong Kong	✓		Trinidad and Tobago	✓	
									Turks and Caicos Isl.	✓	
									Tuvalu	✓	
									United Arab Emirates	✓	
									Vanuatu	✓	✓
									Vatican City	✓	
									Venezuela	✓	✓
									Wallis & Futuna	✓	
									West Bank	✓	
									Western Sahara	✓	

CS: Cross section, P: Panel, CSup: Common support, OCSup: Outside common support

Table C.4: Logit estimates for propensity score

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4
Landlocked	0.359	0.521	0.479	1.168
	(0.638)	(0.729)	(0.735)	(0.935)
Low Income (LI)	97.90	179.4^{+}	178.1^{+}	213.8^{+}
	(60.352)	(94.268)	(95.470)	(119.411)
Lower Middle Income (LMI)	79.85*	110.4^{+}	109.8^{+}	133.8^{+}
	(37.811)	(56.525)	(57.244)	(69.293)
Majority Christian	0.786	-17.82*	-17.79*	-29.62*
	(0.754)	(8.875)	(8.867)	(11.851)
Majority Muslim	0.403			
	(0.744)			
Weighted distance (log)	37.66	55.13	45.07	32.22
	(42.504)	(57.855)	(59.116)	(70.694)
Distance Squared (log)	-1.973	-2.892	-2.337	-1.543
	(2.329)	(3.153)	(3.225)	(3.861)
LI $\times$ Real GDP	37.82^{+}	72.04*	72.56*	89.78*
	(20.905)	(35.524)	(36.084)	(45.638)
LMI $\times$ Real GDP	40.56^{+}	82.39*	82.80*	101.8^{+}
	(24.418)	(41.427)	(42.048)	(53.338)
UMI $\times$ Real GDP	50.69^{+}	96.37*	96.70*	119.1^{+}
	(28.703)	(47.885)	(48.594)	(61.404)
Real GDP Squared	-2.949^{+}	-5.838*	-5.872*	-7.186*
	(1.650)	(2.835)	(2.878)	(3.656)
Agric land % of land area		2.247	2.433	2.206
		(1.543)	(1.571)	(2.025)
Other Religion		-17.19*	-17.23*	-28.63*
		(8.679)	(8.667)	(11.533)
Corruption		-1.500	-5.203	-7.301
		(2.740)	(4.774)	(5.799)
Voice & Accountability		-2.520	-2.779	-4.786^{+}
		(2.162)	(2.223)	(2.854)
Regulatory Quality		1.113	1.075	0.742
		(2.312)	(2.349)	(2.815)
LMI $\times$ Corruption		-3.962	-0.295	3.770
		(3.859)	(4.856)	(6.262)
UMI $\times$ Corruption		-3.599		
		(4.580)		
Political Stability		1.285	1.899	2.802
		(1.805)	(2.093)	(2.302)
Muslim $\times$ Real GDP		-2.473*	-2.468*	-4.022*
		(1.229)	(1.227)	(1.626)
GDP per capita (log)		2.916*	3.043*	2.896^{+}
		(1.317)	(1.357)	(1.677)
Area (log)			0.113	0.0521
			(0.186)	(0.225)
LI $\times$ Corruption			3.478	5.872
			(4.636)	(5.748)
Adj. Saving per GNI				-5.849
				(4.915)
Constant	-398.6^{+}	-662.0^{+}	-619.5^{+}	-647.5
	(230.638)	(347.487)	(352.896)	(423.772)
Observations	110	103	103	90
Chi-square	40.41	53.64	54.02	55.94
Log likelihood	-48.60	-39.19	-39.00	-31.17
Pseudo-R square	0.294	0.406	0.409	0.473

Standard errors in parentheses. Estimation results for the propensity score regressions. Dependent variable is the AGOA treatment. Results in the text are based on Models 1 and 2; results in the appendix are based on model 3. $^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

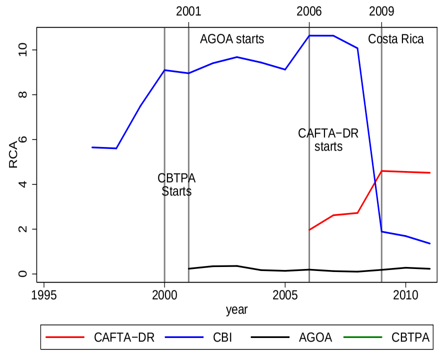
Table C.5: Number of Controls and Treated under common support, Model 1

	Non-agoa	agoa	Total
1	2	1	3
2	14	3	17
3	9	5	14
4	5	11	16
5	7	8	15
6	3	7	10
Total	40	35	75

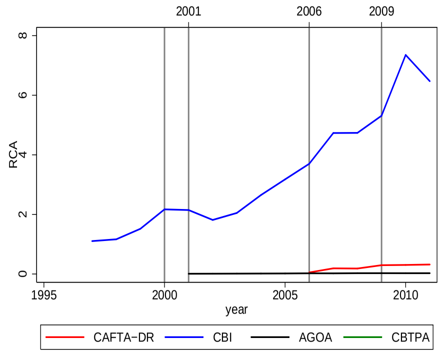
Table C.6: Covariate Balancing Tests

Variable	Sample	Control (Mean)	Treated (Mean)	% bias	% bias reduction	T-test (P-Value)
landlocked	Matched	.371	.343	-6.839	86.364	-.219 (.586)
landlocked	UnMatched	.133	.343	50.154		-2.614 (.01)
Lower Middle Income (LMI)	Matched	.514	.486	-6.303	90.446	-.21 (.583)
Lower Middle Income (LMI)	UnMatched	.187	.486	65.967		-3.384 (.001)
Upper Middle Income (LMI)	Matched	.343	.371	5.783	48.276	.219 (.414)
Upper Middle Income (LMI)	UnMatched	.427	.371	-11.18		.545 (.587)
High Income (HI)	Matched	.143	.143	0	100	0 (.5)
High Income (HI)	UnMatched	.387	.143	-56.962		2.635 (.01)
Majority Christian	Matched	.314	.4	17.198	46.429	.66 (.256)
Majority Christian	UnMatched	.56	.4	-32.103		1.567 (.12)
Majority Muslim	Matched	.371	.371	0	100	0 (.5)
Majority Muslim	UnMatched	.267	.371	22.373		-1.113 (.268)
Other Religion	Matched	.314	.229	-21.206	-55.172	-.712 (.76)
Other Religion	UnMatched	.173	.229	13.666		-.682 (.497)
Weighted Distance (logs)	Matched	9.373	9.334	-9.307	88.132	-.672 (.748)
Weighted Distance (logs)	UnMatched	9.008	9.334	78.416		-3.424 (.001)
Real GDP (logs)	Matched	7.115	7.083	-3.604	96.513	-.149 (.559)
Real GDP (logs)	UnMatched	8.003	7.083	-103.35		4.933 (0)
Distance Squared (logs)	Matched	87.892	87.186	-9.548	87.727	-.662 (.745)
Distance Squared (logs)	UnMatched	81.436	87.186	77.796		-3.413 (.001)
LI × Real GDP	Matched	3.367	3.142	-7.614	88.32	-.253 (.6)
LI × Real GDP	UnMatched	1.218	3.142	65.191		-3.337 (.001)
LMI × Real GDP	Matched	2.522	2.7	4.707	73.958	.186 (.427)
LMI × Real GDP	UnMatched	3.381	2.7	-18.075		.867 (.388)
UMI × Real GDP	Matched	1.226	1.241	.401	99.303	.018 (.493)
UMI × Real GDP	UnMatched	3.404	1.241	-57.577		2.657 (.009)
Real GDP Squared	Matched	51.2	50.835	-2.681	97.417	-.114 (.545)
Real GDP Squared	UnMatched	64.936	50.835	-103.789		4.926 (0)

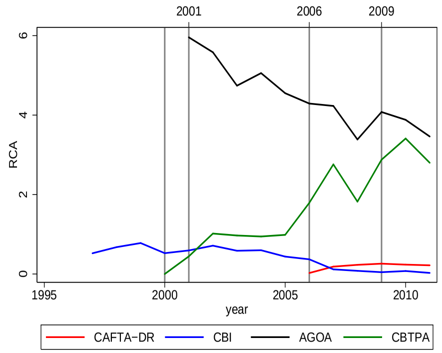
The t-tests are based on the test that there is no difference in the means of the treated and control covariates. The outcomes prior to estimating the propensity score and after are shown as the unmatched and matched rows respectively.



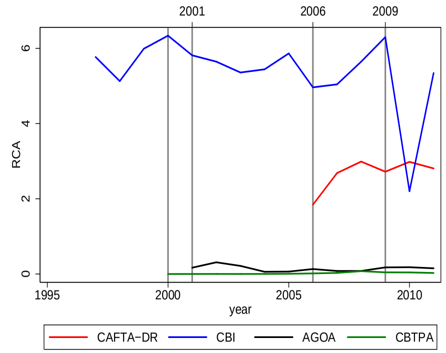
(a) AMDS



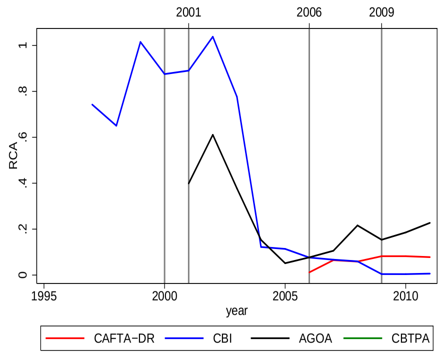
(b) CPR



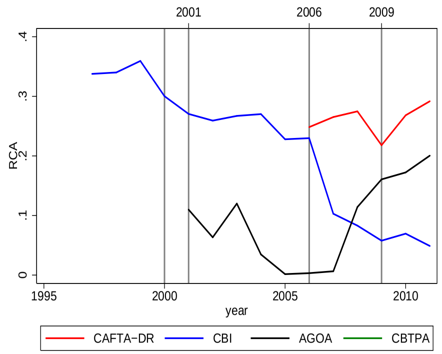
(c) EI



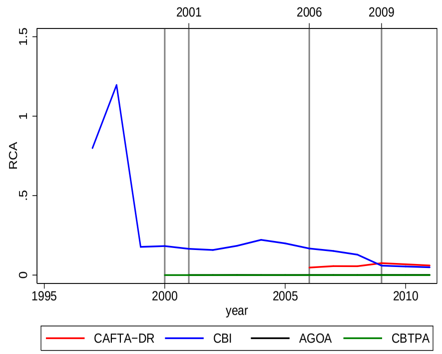
(d) FBTWP



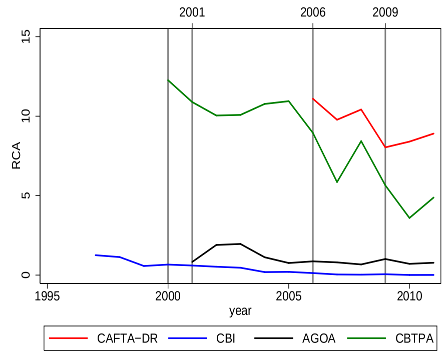
(e) ISOM



(f) METE



(g) OI



(h) TALF

Vertical lines represent years in which the preferential programmes started (with the exception of the CBI). The years 2000, 2001, and 2006 mark when the CBTPA, AGOA and CAFTA-DR programmes had their initial imports. The year 2009 on the other hand, marks the year when Costa-Rica left the CBI/CBTPA programmes and began exporting under the CAFTA-DR FTA. The product groups are based on Hanson (2010, : 7) classification according to HS2 digit products. Note that, the product groups here exclude UN special codes 98 & 99. CAFTA-DR countries have over the period 2006 - 2011 exported products under the HS98 classification. However, in denominator of the numerator term in the RCA formula below, the UN special code categories are included. The RCA is calculated as $\text{RCA}_{ik} = \frac{M_{ik}/\sum_k M_{ik}}{M_{wk}/\sum_k M_{wk}}$, where w is the world, i is one of the four preference groups and k is one of the eight product groups above.

AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97). Source: Calculations based on USITC data

Figure C.1: RCA for AGOA, CAFTA-DR, CBTPA, & CBI programmes by product groups

Table C.7: Description of product classifications

Hanson's (2010) classification	HS code	Product description	Hanson's (2010) classification	HS code	Product description
AMDS	01	Live animals	TALF	50	Silk.
AMDS	02	Meat and edible meat offal	TALF	51	Wool, fine/coarse animal hair, horsehair yarn
AMDS	03	Fish & crustacean, mollusc & other aquatic inv	TALF	52	Cotton.
AMDS	04	Dairy prod; birds'eggs; natural honey; edible	TALF	53	Other vegetable textile fibres; paper yarn & w
AMDS	05	Products of animal origin, nes or included.	TALF	54	Man-made filaments.
AMDS	06	Live tree & other plant; bulb, root; cut flowe	TALF	55	Man-made staple fibres.
AMDS	07	Edible vegetables and certain roots and tubers	TALF	56	Wadding, felt & nonwoven; yarns; twine, cordag
AMDS	08	Edible fruit and nuts; peel of citrus fruit or	TALF	57	Carpets and other textile floor coverings.
AMDS	09	Coffee, tea, mat and spices.	TALF	58	Special woven fab; tufted tex fab; lace; tapes
AMDS	10	Cereals	TALF	59	Impregnated, coated, cover/laminated textile f
FBTWP	11	Prod.mill.indust; malt; starches; inulin; whea	TALF	60	Knitted or crocheted fabrics.
AMDS	12	Oil seed, oleagi fruits; miscell grain, seed,	TALF	61	Art of apparel & clothing access, knitted or c
AMDS	13	Lac; gums, resins & other vegetable saps & ext	TALF	62	Art of apparel & clothing access, not knitted/
AMDS	14	Vegetable plaiting materials; vegetable produc	TALF	63	Other made up textile articles; sets; worn clo
FBTWP	15	Animal/veg fats & oils & their cleavage produc	TALF	64	Footwear, gaiters and the like; parts of such
FBTWP	16	Prep of meat, fish or crustaceans, molluscs et	TALF	65	Headgear and parts thereof.
FBTWP	17	Sugars and sugar confectionery.	OI	66	Umbrellas, walking-sticks, seat-sticks, whips,
FBTWP	18	Cocoa and cocoa preparations.	OI	67	Prepr feathers & down; arti flower; articles h
FBTWP	19	Prep.of cereal, flour, starch/milk; pastrycook	EI	68	Art of stone, plaster, cement, asbestos, mica/
FBTWP	20	Prep of vegetable, fruit, nuts or other parts	EI	69	Ceramic products.
FBTWP	21	Miscellaneous edible preparations.	EI	70	Glass and glassware.
FBTWP	22	Beverages, spirits and vinegar.	EI	71	Natural/cultured pearls, prec stones & metals,
FBTWP	23	Residues & waste from the food indust; prepr a	ISOM	72	Iron and steel.
FBTWP	24	Tobacco and manufactured tobacco substitutes	ISOM	73	Articles of iron or steel.
EI	25	Salt; sulphur; earth & ston; plastering mat; l	ISOM	74	Copper and articles thereof.
EI/ISOM	26	Ores, slag and ash.	ISOM	75	Nickel and articles thereof.
EI	27	Mineral fuels, oils & product of their distill	ISOM	76	Aluminium and articles thereof.
CPR	28	Inorgn chem; compds of prec mtl, radioact elem	ISOM	78	Lead and articles thereof.
CPR	29	Organic chemicals.	ISOM	79	Zinc and articles thereof.
CPR	30	Pharmaceutical products.	ISOM	80	Tin and articles thereof.
CPR	31	Fertilisers.	ISOM	81	Other base metals; cermets; articles thereof.
CPR	32	Tanning/dyeing extract; tannins & derivs; pigm	ISOM	82	Tool, implement, cutlery, spoon & fork, of bas
CPR	33	Essential oils & resinoids; perf, cosmetic/toi	ISOM	83	Miscellaneous articles of base metal.
CPR	34	Soap, organic surface-active agents, washing p	METE	84	Nuclear reactors, boilers, mchy & mech applian
CPR	35	Albuminoidal subs; modified starches; glues; e	METE	85	Electrical mchy equip parts thereof; sound rec
CPR	36	Explosives; pyrotechnic prod; matches; pyrop a	METE	86	Railw/tramw locom, rolling-stock & parts there
OI	37	Photographic or cinematographic goods.	METE	87	Vehicles o/t railw/tramw roll-stock, pts & acc
CPR	38	Miscellaneous chemical products.	METE	88	Aircraft, spacecraft, and parts thereof.
CPR	39	Plastics and articles thereof.	METE	89	Ships, boats and floating structures.
CPR	40	Rubber and articles thereof.	OI	90	Optical, photo, cine, meas, checking, precisio
TALF	41	Raw hides and skins (other than furskins) and	OI	91	Clocks and watches and parts thereof.
TALF	42	Articles of leather; saddlery/harness; travel	OI	92	Musical instruments; parts and access of such
OI	43	Furskins and artificial fur; manufactures ther	OI	93	Arms and ammunition; parts and accessories the
FBTWP	44	Wood and articles of wood; wood charcoal.	OI	94	Furniture; bedding, mattress, matt support, cu
FBTWP	45	Cork and articles of cork.	OI	95	Toys, games & sports requisites; parts & acces
FBTWP	46	Manufactures of straw, esparto/other plaiting	OI	96	Miscellaneous manufactured articles.
FBTWP	47	Pulp of wood/of other fibrous cellulosic mat;	OI	97	Works of art, collectors'pieces and antiques.
FBTWP	48	Paper & paperboard; art of paper pulp, paper/p	Not Assigned	98	UN Special Code
OI	49	Printed books, newspapers, pictures & other pr	Not Assigned	99	UN Special Code

Table C.8: Exact Nearest Neighbour matching based on Abadie and Imbens (2011) & Abadie et al.'s (2001) (All AGOA) Mahalanobis metric with heteroscedastic robust standard errors

	Model A: Covariates based on propensity score[a]					Model B: With additional covariates[b]				
Outcome	# Treated	# Control	SATT	Std. Error	Z-statistic	# Treated	# Control	SATT	Std. Error	Z-statistic
Exports	42	81	723 299 184.76	725 616 818.54	0.997	42	43	-29 753 995 785.14	1 546 304 898.90	-19.242
Export Share	42	81	0.09	0.05	1.872	42	43	-0.26	0.05	-5.120
Exports (2002 - 1997)	42	74	-539 973 796.22	168 800 979.70	-3.199	42	37	-2 643 930 903.17	316 569 148.44	-8.352
Exports (2005 - 1997)	42	74	-1 629 601 213.41	554 141 801.89	-2.941	42	37	-6 822 892 445.33	705 616 705.55	-9.669
Exports (2007 - 1997)	42	74	-2 436 624 108.11	838 020 507.29	-2.908	42	37	-8 846 669 305.67	866 674 970.48	-10.208
Exports (2010 - 1997)	42	74	-4 259 853 571.68	781 272 758.04	-5.452	42	37	-10 061 016 744.00	831 639 692.14	-12.098
Exports: AMDS	42	80	-147 563 343.10	15 841 039.69	-9.315	42	42	-1 348 290 683.14	79 490 306.98	-16.962
Exports: FBTWP	42	77	-38 387 870.18	21 327 591.15	-1.800	42	42	-3 970 707 984.86	204 692 952.00	-19.398
Exports: EI	42	78	881 613 532.10	571 762 975.88	1.542	42	42	-6 003 267 710.96	355 028 524.22	-16.909
Exports: CPR	42	79	-5 497 393.53	71 526 142.17	-0.077	42	41	-1 878 607 403.07	121 131 633.24	-15.509
Exports: TALF	42	80	-463 722 562.10	282 719 792.81	-1.640	42	42	-4 903 715 537.14	337 889 718.07	-14.513
Exports: ISOM	42	76	21 374 626.02	41 762 801.47	0.512	42	40	-4 209 206 396.67	204 096 311.07	-20.624
Exports: METE	42	81	477 426 668.76	193 241 093.01	2.471	42	43	-6 950 374 697.29	540 619 707.12	-12.856
Exports: OI	42	81	-69 508 795.19	25 061 937.12	-2.773	42	43	-959 197 964.93	6 6974 789.82	-14.322

Critical values $Z(\alpha = 0.05) = 1.96$; $Z(\alpha = 0.1) = 1.64$. Matching Variables: landlocked, LI, LMI, Majority Christian, Majority Muslim Distance (Weighted, in logs), Real GDP (logs), Distance squared, Real GDP squared, LI × Real GDP, LMI × Real GDP, UMI × Real GDP. Bias-adj Variables: landlocked, LI, LMI, Majority Christian, Majority Muslim Distance (Weighted, in logs), Real GDP (logs), Distance squared, Real GDP squared, LI × Real GDP, LMI × Real GDP, UMI × Real GDP. Exact matching done on LI, LMI, Majority Christian and Majority Muslim. [a]: Covariates used in estimating the propensity score model is used here for comparison; [b]: Additional covariates — land and capital per worker as well as human capital are included. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Table C.9: Exact Nearest Neighbour matching based on Abadie and Imbens (2011) & Abadie et al.'s (2001) (Always in AGOA) Mahalanobis metric with heteroscedastic robust standard errors

	Model A: Covariates based on propensity score[a]					Model B: With additional covariates[b]				
Outcome	# Treated	# Control	SATT	Std. Error	Z-statistic	# Treated	# Control	SATT	Std. Error	Z-statistic
Exports	29	81	-217 044 409.38	1 172 860 790.26	-0.185	29	49	-3 492 490 355.81	1 888 760 294.61	-1.849
Export Share	29	81	0.14	0.05	2.670	29	49	0.01	0.06	0.132
Exports (2002 - 1997)	29	74	-54 398 369.00	222 251 213.43	-0.245	29	43	-1 936 971 060.71	430 305 255.26	-4.501
Exports (2005 - 1997)	29	74	646 761 090.67	850 810 392.25	0.760	29	43	-5 062 933 790.12	970 085 119.37	-5.219
Exports (2007 - 1997)	29	74	2 943 371 168.00	1 247 631 056.77	2.359	29	43	-6 879 414 000.94	1 181 410 308.63	-5.823
Exports (2010 - 1997)	29	74	4 317 682 240.00	1 161 785 719.67	3.716	29	43	-8 420 804 306.82	1 120 145 509.94	-7.518
Exports: AMDS	29	80	-341 157 516.52	19 661 619.77	-17.351	29	48	-521 955 716.57	102 085 594.11	-5.113
Exports: FBTWP	29	79	-90 311 266.98	18 855 784.63	-4.790	29	48	-60 679 337.14	267 024 245.74	-0.227
Exports: EI	29	78	1 279 884 424.52	992 366 698.72	1.290	29	48	16 4526 825.90	472 094 219.05	0.349
Exports: CPR	29	80	-38 727 771.55	101 076 033.83	-0.383	29	48	-52 212 404.95	144 236 921.73	-0.362
Exports: TALF	29	80	-818 068 256.17	230 544 255.11	-3.548	29	48	-2 520 202 150.10	368 575 674.00	-6.838
Exports: ISOM	29	77	10 364 287.70	59 411 781.61	0.174	29	46	-352 373 283.20	275 338 058.32	-1.280
Exports: METE	29	81	117 966 841.38	280 099 951.75	0.421	29	49	-72 086 142.48	586 087 572.00	-0.123
Exports: OI	29	81	-295 585 650.10	36 723 772.97	-8.049	29	49	-501 053 644.19	63 944 099.20	-7.836

Critical values $Z(\alpha = 0.05) = 1.96$; $Z(\alpha = 0.1) = 1.64$. Matching Variables: landlocked, LI, LMI, Majority Christian, Majority Muslim Distance (Weighted, in logs), Real GDP (logs), Distance squared, Real GDP squared, LI × Real GDP, LMI × Real GDP, UMI × Real GDP. Bias-adj Variables: landlocked, LI, LMI, Majority Christian, Majority Muslim Distance (Weighted, in logs), Real GDP (logs), Distance squared, Real GDP squared, LI × Real GDP, LMI × Real GDP, UMI × Real GDP. Exact matching done on LI, LMI, Majority Christian and Majority Muslim. [a]: Covariates used in estimating the propensity score model is used here for comparison; [b]: Additional covariates — land and capital per worker as well as human capital are included. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Table C.10: Exact Nearest Neighbour matching based on Abadie and Imbens (2011) & Abadie et al.'s (2001) (Have both AGOA & EBA preferences) Mahalanobis metric with heteroscedastic robust standard errors

	Model A: Covariates based on propensity score[a]					Model B: With additional covariates[b]				
Outcome	# Treated	# Control	SATT	Std. Error	Z-statistic	# Treated	# Control	SATT	Std. Error	Z-statistic
Exports	17	81	3 306 558 490.35	748 405 541.54	4.418	17	51	273 192 570.18	518 572 945.37	0.527
Export Share	17	81	0.18	0.07	2.621	17	51	0.21	0.09	2.227
Exports (2002 - 1997)	17	77	690 825 666.67	120 695 445.08	5.724	17	48	-86 520 784.00	183 887 579.07	-0.471
Exports (2005 - 1997)	17	77	170 222 498.13	459 269 074.00	0.371	17	48	-214 481 926.40	339 751 892.76	-0.631
Exports (2007 - 1997)	17	77	937 469 677.87	749 311 832.44	1.251	17	48	-361 668 038.40	501 385 098.44	-0.721
Exports (2010 - 1997)	17	77	-215 200 213.33	740 063 358.86	-0.291	17	48	-630 701 215.20	552 643 801.33	-1.141
Exports: AMDS	17	80	58 616 646.09	16 903 730.93	3.468	17	50	8 888 929.82	16 615 088.64	0.535
Exports: FBTWP	17	79	6 859 301.38	5 844 071.80	1.174	17	50	16 828 680.41	4 321 676.17	3.894
Exports: EI	17	78	668 057 848.94	540 559 634.84	1.236	17	50	-5 233 638.73	15 899 594.01	-0.329
Exports: CPR	17	80	29 231 881.85	6 592 997.63	4.434	17	50	2 077 518.16	2 712 144.69	0.766
Exports: TALF	17	80	1 185 322 047.29	334 775 556.98	3.541	17	50	220 774 504.73	499 140 053.69	0.442
Exports: ISOM	17	77	27 344 216.95	9 836 800.90	2.780	17	48	27 025 892.40	11 745 665.26	2.301
Exports: METE	17	81	1 016 573 160.47	227 630 193.68	4.466	17	51	1 044 522.43	620 535.62	1.683
Exports: OI	17	81	177 434 496.00	28 261 846.14	6.278	17	51	2 088 259.67	10 079 754.20	0.207

Critical values $Z(\alpha = 0.05) = 1.96$; $Z(\alpha = 0.1) = 1.64$. Matching Variables: landlocked, LI, LMI, Majority Christian, Majority Muslim Distance (Weighted, in logs), Real GDP (logs), Distance squared, Real GDP squared, LI $\times$ Real GDP, LMI $\times$ Real GDP, UMI $\times$ Real GDP. Bias-adj Variables: landlocked, LI, LMI, Majority Christian, Majority Muslim Distance (Weighted, in logs), Real GDP (logs), Distance squared, Real GDP squared, LI $\times$ Real GDP, LMI $\times$ Real GDP, UMI $\times$ Real GDP. Exact matching done on LI, LMI, Majority Christian and Majority Muslim. [a]: Covariates used in estimating the propensity score model is used here for comparison; [b]: Additional covariates — land and capital per worker as well as human capital are included. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Table C.11: Sensitivity Analysis: All AGOA

Outcome	ATT	Output Effect	Selection Effect
Exports	-918 813 824.00	0.33	9.46
Export Share	0.01	0.75	9.83
Exports (2002 - 1997)	-428 744 736.00	0.82	9.61
Exports (2005 - 1997)	-342 771 680.00	0.88	9.52
Exports (2007 - 1997)	-418 388 448.00	1.38	9.55
Exports (2010 - 1997)	-741 396 416.00	1.50	9.80
Exports: AMDS	-124 871 808.00	0.74	10.03
Exports: FBTWP	-66 321 348.00	0.39	10.11
Exports: EI	539 518 400.00	0.41	10.09
Exports: CPR	-83 352 768.00		9.60
Exports: TALF	-742 025 152.00	1.79	10.01
Exports: ISOM	-65 693 728.00		10.19
Exports: METE	-325 135 456.00		9.83
Exports: OI	-102 425 184.00		9.73

Based on Income being the confounder. The methods here are described in Ichino et al. (2006) and Nannicini (2007). 1000 replications are conducted. The binary transformation is based on the mean value of each outcome (Y). The output effect is the average odds ratio of U based on a logit model of $Pr(I(Y > \bar{Y}) = 1|T = 0, U, W)$. The selection effect is the average odds ratio of U based on $Pr(T = 1|U, W)$. T is the treatment, W is the observable vector of covariates and U is the unobserved (or confounding) factors. Output effect $= \frac{Pr(I(Y>\bar{Y})=1|T=0,U=1,W)}{Pr(I(Y>\bar{Y})=0|T=0,U=1,W)} / \frac{Pr(I(Y>\bar{Y})=1|T=0,U=0,W)}{Pr(I(Y>\bar{Y})=0|T=0,U=0,W)}$. Selection effect $= \frac{Pr(T=1|U=1,W)}{Pr(T=0|U=1,W)} / \frac{Pr(T=1|U=0,W)}{Pr(T=0|U=0,W)}$. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Table C.12: Sensitivity Analysis: All AGOA

Outcome	ATT	Output Effect	Selection Effect
Exports	-918 813 824.00	0.94	0.70
Export Share	0.01	1.85	0.71
Exports (2002 - 1997)	-428 744 736.00	0.60	0.70
Exports (2005 - 1997)	-342 771 680.00	0.52	0.72
Exports (2007 - 1997)	-418 388 448.00	0.41	0.71
Exports (2010 - 1997)	-741 396 416.00	0.41	0.73
Exports: AMDS	-124 871 808.00	2.06	0.69
Exports: FBTWP	-66 321 348.00	1.81	0.68
Exports: EI	539518400.00	1.20	0.71
Exports: CPR	-83 352 768.00	0.82	0.71
Exports: TALF	-742 025 152.00	0.73	0.70
Exports: ISOM	-65 693 728.00	0.71	0.74
Exports: METE	-325 135 456.00	0.62	0.71
Exports: OI	-102 425 184.00	0.79	0.71

Based on Religion being the confounder. The methods here are described in Ichino et al. (2006) and Nannicini (2007). 1000 replications are conducted. The binary transformation is based on the mean value of each outcome (Y). The output effect is the average odds ratio of U based on a logit model of $Pr(I(Y > \bar{Y}) = 1|T = 0, U, W)$. The selection effect is the average odds ratio of U based on $Pr(T = 1|U, W)$. T is the treatment, W is the observable vector of covariates and U is the unobserved (or confounding) factors. Output effect $= \frac{Pr(I(Y>\bar{Y})=1|T=0,U=1,W)}{Pr(I(Y>\bar{Y})=0|T=0,U=1,W)} / \frac{Pr(I(Y>\bar{Y})=1|T=0,U=0,W)}{Pr(I(Y>\bar{Y})=0|T=0,U=0,W)}$. Selection effect $= \frac{Pr(T=1|U=1,W)}{Pr(T=0|U=1,W)} / \frac{Pr(T=1|U=0,W)}{Pr(T=0|U=0,W)}$. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Table C.13: Sensitivity Analysis: Always in AGOA

Outcome	ATT	Output Effect	Selection Effect
Exports	-748 016 192.00	0.33	5.14
Export Share	0.04	0.84	5.42
Exports (2002 - 1997)	-457 082 944.00	0.76	5.34
Exports (2005 - 1997)	-29 936 260.00	0.92	5.50
Exports (2007 - 1997)	184 289 568.00	1.02	5.42
Exports (2010 - 1997)	-86 024 848.00	1.59	5.35
Exports: AMDS	-130 864 808.00	0.76	5.55
Exports: FBTWP	-100 010 288.00	0.36	5.69
Exports: EI	813 692 928.00	0.41	5.48
Exports: CPR	-106 409 104.00		5.43
Exports: TALF	-680 370 304.00	1.76	5.55
Exports: ISOM	-86 093 176.00		5.81
Exports: METE	-435 430 368.00		5.60
Exports: OI	-97 720 536.00		5.58

Based on Income being the confounder. The methods here are described in Ichino et al. (2006) and Nannicini (2007). 1000 replications are conducted. The binary transformation is based on the mean value of each outcome (Y). The output effect is the average odds ratio of U based on a logit model of $Pr(I(Y > \bar{Y}) = 1|T = 0, U, W)$. The selection effect is the average odds ratio of U based on $Pr(T = 1|U, W)$. T is the treatment, W is the observable vector of covariates and U is the unobserved (or confounding) factors. Output effect $= \frac{Pr(I(Y>\bar{Y})=1|T=0,U=1,W)}{Pr(I(Y>\bar{Y})=0|T=0,U=1,W)} / \frac{Pr(I(Y>\bar{Y})=1|T=0,U=0,W)}{Pr(I(Y>\bar{Y})=0|T=0,U=0,W)}$. Selection effect $= \frac{Pr(T=1|U=1,W)}{Pr(T=0|U=1,W)} / \frac{Pr(T=1|U=0,W)}{Pr(T=0|U=0,W)}$. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Table C.14: Sensitivity Analysis: Always AGOA

Outcome	ATT	Output Effect	Selection Effect
Exports	-748 016 192.00	0.92	1.04
Export Share	0.04	1.53	1.07
Exports (2002 - 1997)	-457 082 944.00	0.59	1.04
Exports (2005 - 1997)	-29 936 260.00	0.47	1.08
Exports (2007 - 1997)	184 289 568.00	0.45	1.09
Exports (2010 - 1997)	-86 024 848.00	0.47	1.05
Exports: AMDS	-130 864 808.00	2.07	1.04
Exports: FBTWP	-100 010 288.00	1.79	1.01
Exports: EI	813 692 928.00	1.24	1.04
Exports: CPR	-106 409 104.00	0.72	1.06
Exports: TALF	-680 370 304.00	0.74	1.05
Exports: ISOM	-86 093 176.00	0.95	1.08
Exports: METE	-435 430 368.00	0.64	1.07
Exports: OI	-97 720 536.00	0.84	1.06

Based on Religion being the confounder. The methods here are described in Ichino et al. (2006) and Nannicini (2007). 1000 replications are conducted. The binary transformation is based on the mean value of each outcome (Y). The output effect is the average odds ratio of U based on a logit model of $Pr(I(Y > \bar{Y}) = 1|T = 0, U, W)$. The selection effect is the average odds ratio of U based on $Pr(T = 1|U, W)$. T is the treatment, W is the observable vector of covariates and U is the unobserved (or confounding) factors. Output effect $= \frac{Pr(I(Y>\bar{Y})=1|T=0,U=1,W)}{Pr(I(Y>\bar{Y})=0|T=0,U=1,W)} / \frac{Pr(I(Y>\bar{Y})=1|T=0,U=0,W)}{Pr(I(Y>\bar{Y})=0|T=0,U=0,W)}$. Selection effect $= \frac{Pr(T=1|U=1,W)}{Pr(T=0|U=1,W)} / \frac{Pr(T=1|U=0,W)}{Pr(T=0|U=0,W)}$. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Table C.15: All AGOA: Caliper = 0.05

Outcome	Caliper (δ)	Γ	Sign Rank plus	Sign Rank minus	Prob. Value plus	Prob. Value minus
Exports	.05	1	-3.1002	-3.1002	.999	.999
Exports	.05	1.4	-4.0406	-2.2479	1	.9877
Exports	.05	1.5	-4.2466	-2.0817	1	.9813
Exports	.05	1.6	-4.4439	-1.9286	1	.9731
Exports	.05	2	-5.1631	-1.4135	1	.9212
Exports	.05	3	-6.6414	-.5182	1	.6979
Exports	.05	4	-7.8524	.1018	1	.4594
Exports	.05	5	-8.9024	.5836	1	.2797
Exports	.05	6	-9.842	.9824	1	.163
Exports	.05	7	-10.7	1.3257	1	.0925
Exports	.05	8	-11.4944	1.6295	1	.0516
Exports (2002 - 1997)	.05	1	-4.3943	-4.3943	1	1
Exports (2002 - 1997)	.05	1.4	-5.291	-3.6222	1	.9999
Exports (2002 - 1997)	.05	1.5	-5.4925	-3.4772	1	.9997
Exports (2002 - 1997)	.05	1.6	-5.6869	-3.3454	1	.9996
Exports (2002 - 1997)	.05	2	-6.4061	-2.9155	1	.9982
Exports (2002 - 1997)	.05	3	-7.9241	-2.2239	1	.9869
Exports (2002 - 1997)	.05	4	-9.1952	-1.7904	1	.9633
Exports (2002 - 1997)	.05	5	-10.3109	-1.4801	1	.9306
Exports (2002 - 1997)	.05	6	-11.3171	-1.2405	1	.8926
Exports (2002 - 1997)	.05	7	-12.241	-1.046	1	.8522
Exports (2002 - 1997)	.05	8	-13.0998	-.8826	1	.8113

The calculations in the table are based on Rosenbaum (1987, 1991a,b) The log odds of being in the treatment group is given by the logit model $\log[Pr(T=1|X=x,U=u)/Pr(T=0|X=x,U=x)] = \kappa_x + \gamma u$, where $\gamma = \log(\Gamma)$, for each x, κ_x is an unknown parameter, X is the matching covariates, u is the unobserved variable. The Γ indicates the odds of a person likely to receive treatment. If $\Gamma = 1$ this is the case for a randomized experiment since the odds of receiving treatment is random and each individual is just as likely as receiving treatment. Γ values larger than one indicate that we are no longer in a randomized experiment design. The likelihood of receiving treatment becomes larger than 1. Thus a value of 3 implies an individual is three times more likely to receive treatment because of any hidden differences in their characteristics. The simulation thus tells at how sensitive our results would be given our simulation of the parameter—thus measuring the departure from a randomized experiment in Rosenbaum's words. The level of Γ tolerable is based on the p-values. As long as the p-values are at 0.05 and below we can significantly conclude that hidden biases would not change the conclusion of our analysis. If one or both of the p-values are greater than the rejection level for a particular choice of Γ then we might be worried about the potential of hidden bias affecting our conclusions. The sensitivity analysis for the caliper values of 0.1 and 0.2 are not presented to conserve space. They are however, available upon request.

Table C.16: Always AGOA: Caliper = 0.05

Outcome	Caliper (δ)	Γ	Sign Rank plus	Sign Rank minus	Prob. Value plus	Prob. Value minus
Exports	.05	1	-1.9583	-1.9583	.9749	.9749
Exports	.05	1.4	-2.7675	-1.2048	.9972	.8859
Exports	.05	1.5	-2.9423	-1.0551	.9984	.8543
Exports	.05	1.6	-3.109	-.9163	.9991	.8203
Exports	.05	2	-3.7115	-.4428	.9999	.671
Exports	.05	3	-4.9302	.4076	1	.3418
Exports	.05	4	-5.9149	1.019	1	.1541
Exports	.05	5	-6.762	1.5072	1	.0659
Exports	.05	6	-7.5161	1.9197	1	.0274
Exports	.05	7	-8.2023	2.2808	1	.0113
Exports	.05	8	-8.8359	2.6045	1	.0046
Exports (2002 - 1997)	.05	1	-3.5281	-3.5281	.9998	.9998
Exports (2002 - 1997)	.05	1.4	-4.2876	-2.8687	1	.9979
Exports (2002 - 1997)	.05	1.5	-4.4577	-2.7441	1	.997
Exports (2002 - 1997)	.05	1.6	-4.6215	-2.6305	1	.9957
Exports (2002 - 1997)	.05	2	-5.2261	-2.2582	1	.988
Exports (2002 - 1997)	.05	3	-6.4972	-1.6506	1	.9506
Exports (2002 - 1997)	.05	4	-7.5581	-1.2622	1	.8966
Exports (2002 - 1997)	.05	5	-8.4876	-.9793	1	.8363
Exports (2002 - 1997)	.05	6	-9.3251	-.7574	1	.7756
Exports (2002 - 1997)	.05	7	-10.0933	-.5748	1	.7173
Exports (2002 - 1997)	.05	8	-10.8071	-.4194	1	.6625

The calculations in the table are based on Rosenbaum (1987, 1991a,b) The log odds of being in the treatment group is given by the logit model $\log[Pr(T=1|X=x,U=u)/Pr(T=0|X=x,U=x)] = \kappa_x + \gamma u$, where $\gamma = \log(\Gamma)$, for each x, κ_x is an unknown parameter, X is the matching covariates, u is the unobserved variable. The Γ indicates the odds of a person likely to receive treatment. If $\Gamma = 1$ this is the case for a randomized experiment since the odds of receiving treatment is random and each individual is just as likely as receiving treatment. Γ values larger than one indicate that we are no longer in a randomized experiment design. The likelihood of receiving treatment becomes larger than 1. Thus a value of 3 implies an individual is three times more likely to receive treatment because of any hidden differences in their characteristics. The simulation thus tells at how sensitive our results would be given our simulation of the parameter—thus measuring the departure from a randomized experiment in Rosenbaum's words. The level of Γ tolerable is based on the p-values. As long as the p-values are at 0.05 and below we can significantly conclude that hidden biases would not change the conclusion of our analysis. If one or both of the p-values are greater than the rejection level for a particular choice of Γ then we might be worried about the potential of hidden bias affecting our conclusions. The sensitivity analysis for the caliper values of 0.1 and 0.2 are not presented to conserve space. They are however, available upon request.

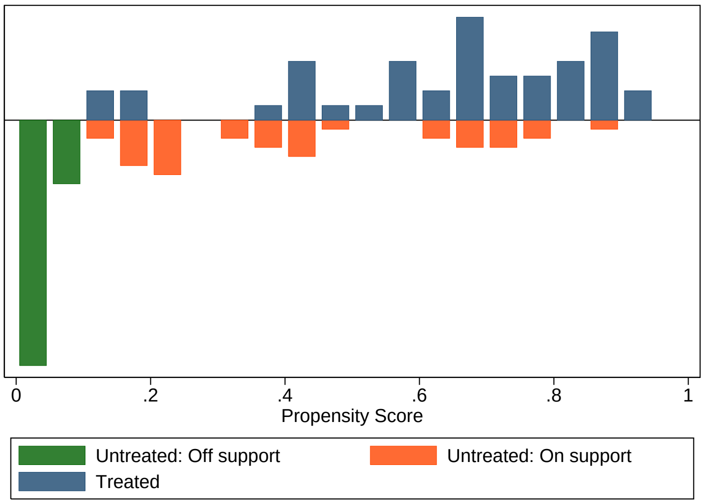


Figure C.2: *Propensity score and region of common support*

Table C.17: Simple Average tariffs: Apparel & Textile and Fuel products, 2002–2011

	Apparel_textile			Fuel			Total		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
MFN	8.8	0.0	28.6	0.5	0.0	7.0	8.4	0.0	28.6
AGOA	0.0	0.0	0.0	0.3	0.0	0.7	0.0	0.0	0.7
CBTPA	0.0	0.0	0.0	0.9	0.0	7.0	0.2	0.0	7.0

Author's calculation based on the relevant HS-6 digit products downloaded from the WITS database. '.' indicates missing tariff information. Apparel and textile is based on six digit products within HS 50–63; Fuel is based on six digit products within HS 27. The tariff information for the AGOA and CBTPA preferences are missing for most years. The zero tariffs reported for the CBTPA and AGOA preferences are based on years of non-missing tariff data.

Table C.18: Simple average MFN tariffs: Apparel and Textile products, 2002–2011

	Mean	Min	Max
Apparel	10.4	0.0	28.6
Textile	8.0	0.0	20.8
Total	8.8	0.0	28.6

Author's calculation based on the relevant HS-6 digit products downloaded from the WITS database. '.' indicates missing tariff information. Textile is based on six digit products within HS 50–60; Apparel is based on six digit products within HS 61–63. The tariff information for the AGOA and CBTPA preferences are missing for most years. However, in 2009 and 2010 several HS 61 & 62 six digit categories have a zero tariff reported for the special textile preferences.

Table C.19: Simple average tariffs by Hanson's classification, 2002–2011

		Mean	Min	Max
AMDS	MFN	3.6	0.0	163.8
	AGOA	1.2	0.0	81.9
	CBTPA	.	.	.
CPR	MFN	2.9	0.0	9.2
	AGOA	1.4	0.0	4.6
	CBTPA	.	.	.
EI	MFN	2.1	0.0	16.5
	AGOA	1.3	0.0	8.1
	CBTPA	0.9	0.0	7.0
FBTWP	MFN	5.6	0.0	350.0
	AGOA	4.4	0.0	175.0
	CBTPA	3.2	2.3	5.2
ISOM	MFN	1.6	0.0	15.0
	AGOA	0.5	0.0	4.4
	CBTPA	.	.	.
METE	MFN	1.6	0.0	25.0
	AGOA	0.5	0.0	5.0
	CBTPA	.	.	.
OI	MFN	2.2	0.0	14.4
	AGOA	0.5	0.0	7.2
	CBTPA	0.2	0.0	2.1
TALF	MFN	8.5	0.0	37.5
	AGOA	0.8	0.0	10.1
	CBTPA	1.4	0.0	30.7
Total	MFN	3.7	0.0	350.0
	AGOA	1.6	0.0	175.0
	CBTPA	1.1	0.0	30.7

Author's calculation based on the relevant HS-6 digit products downloaded from the WITS database. '.' indicates missing tariff information. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97) (all computations are done at the HS six digit level for all products within each HS two digit category specified above).

Table C.20: RMSPE values for treated countries

country	Non-Oil	Total Exports
Angola	1.0521	0.2345
Benin	1.6131	1.7569
Burkina Faso	2.2862	2.1140
Burundi	1.1122	1.0537
Cameroon	0.3562	1.0401
Chad	3.1161	2.8877
Congo, Rep.	0.6702	0.6192
Gabon	0.4763	0.3997
Gambia, The	1.9314	1.8653
Ghana	0.4602	0.4102
Kenya	0.3106	0.2025
Malawi	0.3646	0.3757
Mauritius	0.3254	0.4856
Mozambique	0.4661	0.3822
Nigeria	0.4633	0.1893
Rwanda	1.0882	0.8992
Senegal	0.7270	0.9141
Seychelles	1.3505	1.4074
Sierra Leone	0.7327	0.7567
South Africa	0.6453	0.3743
Tanzania	0.3841	0.3746
Togo	1.4889	1.1303
Uganda	0.8723	0.5403
Zambia	1.1064	1.0523

RMSPE is the root mean squared prediction error

Table C.21: RMSPE values for control countries used in placebo runs

country	Non-Oil	Total Exports
Afghanistan	0.3420	0.4751
Algeria	1.0376	0.4148
Argentina	0.3099	0.1733
Bahrain	0.5199	0.5623
Bangladesh	-	0.2114
Brunei	0.8930	0.8820
Egypt, Arab Rep.	0.2649	0.3787
Fiji	0.7063	0.9409
India	0.1057	0.1736
Indonesia	0.0891	0.2286
Iran, Islamic Rep.	4.0099	5.2300
Jordan	0.5153	0.6275
Kuwait	0.7293	0.9420
Lao PDR	0.9615	1.0231
Lebanon	0.4839	0.5399
Macao	0.3080	0.3052
Malaysia	0.2951	0.7033
Mongolia	0.6046	0.6365
Morocco	0.2359	0.3471
Nepal	0.3809	0.7206
New Caledonia	0.5587	0.5476
Oman	0.9152	0.4622
Pakistan	0.2062	0.2063
Papua New Guinea	0.3628	0.3654
Paraguay	0.3861	0.4482
Philippines	0.2199	0.1470
Qatar	1.0932	1.3909
Saudi Arabia	0.3798	0.5469
Singapore	0.3997	0.5149
Solomon Islands	2.0101	2.0099
Sri Lanka	0.1035	0.1235
Syrian Arab Republic	0.5124	0.9405
Thailand	0.3797	0.4557
Tunisia	0.3201	0.7668
United Arab Emirates	-	0.7831
Uruguay	0.3451	0.3465
Venezuela	0.2882	0.2844

RMSPE is the root mean squared prediction error. A '-' implies that no value for the RMSPE was returned as discontinuities were encountered in the estimation and thus a more straightforward and flexible algorithm had to be used instead.

Table C.22: Weights for synthetic countries: non-oil exports

Treated Country	Synthetic country	Synthetic Weights
Angola	Lao PDR	0.255
Angola	New Caledonia	0.560
Angola	Syrian Arab Republic	0.184
Burkina Faso	Lao PDR	0.778
Burkina Faso	Qatar	0.222
Congo, Rep.	Macao	0.756
Congo, Rep.	Solomon Islands	0.113
Congo, Rep.	Venezuela	0.131
Gabon	Algeria	0.002
Gabon	Bahrain	0.181
Gabon	Indonesia	0.109
Gabon	Malaysia	0.042
Gabon	New Caledonia	0.087
Gabon	Solomon Islands	0.001
Gabon	Sri Lanka	0.391
Gabon	Venezuela	0.183
Gambia	Lao PDR	0.991
Gambia	Solomon Islands	0.009
Ghana	Brunei	0.059
Ghana	New Caledonia	0.348
Ghana	Papua New Guinea	0.251
Ghana	Philippines	0.053
Ghana	Solomon Islands	0.047
Ghana	Venezuela	0.242

Kenya	Bahrain	0.040
Kenya	India	0.234
Kenya	Iran Islamic Rep	0.071
Kenya	Jordan	0.239
Kenya	Papua New Guinea	0.400
Kenya	Solomon Islands	0.016
Mauritius	Fiji	0.547
Mauritius	Jordan	0.019
Mauritius	Macao	0.309
Mauritius	Singapore	0.064
Mauritius	Solomon Islands	0.061
Nigeria	Algeria	0.332
Nigeria	Saudi Arabia	0.634
Nigeria	Venezuela	0.034
Sierra Leone	New Caledonia	0.643
Sierra Leone	Paraguay	0.322
Sierra Leone	Solomon Islands	0.036
South Africa	Algeria	0.195
South Africa	Egypt Arab Rep	0.152
South Africa	India	0.040
South Africa	Indonesia	0.560
South Africa	Singapore	0.053

Table C.23: Weights for synthetic countries: total exports

Treated Country	Synthetic country	Synthetic Weights
Angola	Algeria	0.004
Angola	Bahrain	0.183
Angola	Bangladesh	0.001
Angola	Brunei	0.001
Angola	Fiji	0.001
Angola	Indonesia	0.047
Angola	Iran Islamic Rep	0.001
Angola	Kuwait	0.001
Angola	Lebanon	0.001
Angola	Macao	0.246
Angola	Malaysia	0.174
Angola	New Caledonia	0.005
Angola	Oman	0.001
Angola	Papua New Guinea	0.001
Angola	Philippines	0.002
Angola	Qatar	0.001
Angola	Saudi Arabia	0.001
Angola	Singapore	0.056
Angola	Solomon Islands	0.006
Angola	Sri Lanka	0.002
Angola	Thailand	0.001
Angola	United Arab Emirates	0.002
Angola	Uruguay	0.001
Angola	Venezuela	0.260
Burkina Faso	Bahrain	0.010
Burkina Faso	Lao PDR	0.836
Burkina Faso	Mongolia	0.154
Congo, Rep.	Macao	0.756
Congo, Rep.	Solomon Islands	0.113
Congo, Rep.	Venezuela	0.131
Gabon	Algeria	0.002
Gabon	Bahrain	0.181
Gabon	Indonesia	0.109
Gabon	Malaysia	0.042
Gabon	New Caledonia	0.087
Gabon	Solomon Islands	0.001
Gabon	Sri Lanka	0.391
Gabon	Venezuela	0.183
Gambia	Lao PDR	0.952
Gambia	Solomon Islands	0.048
Ghana	Brunei	0.059
Ghana	New Caledonia	0.348
Ghana	Papua New Guinea	0.251
Ghana	Philippines	0.053
Ghana	Solomon Islands	0.047

Ghana	Venezuela	0.242
Kenya	Bahrain	0.040
Kenya	India	0.234
Kenya	Iran Islamic Rep	0.071
Kenya	Jordan	0.239
Kenya	Papua New Guinea	0.400
Kenya	Solomon Islands	0.016
Mauritius	Fiji	0.547
Mauritius	Jordan	0.019
Mauritius	Macao	0.309
Mauritius	Singapore	0.064
Mauritius	Solomon Islands	0.061
Nigeria	Algeria	0.332
Nigeria	Saudi Arabia	0.634
Nigeria	Venezuela	0.034
Sierra Leone	New Caledonia	0.712
Sierra Leone	Papua New Guinea	0.222
Sierra Leone	Solomon Islands	0.066
South Africa	Algeria	0.195
South Africa	Egypt Arab Rep	0.152
South Africa	India	0.040
South Africa	Indonesia	0.560
South Africa	Singapore	0.053

Table C.24: Treated vs. Synthetic predictors for Non-Oil exports

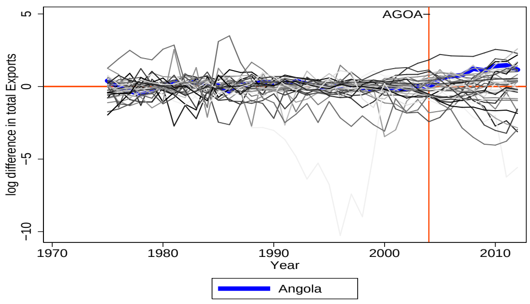
Predictor	Treated	Synthetic
Angola		
Area (in logs)	14.03601	10.90519
Weighted distance (in logs)	9.405381	9.403334
English speaking dummy	0	0
GDP (in logs)	8.79734	7.707983
landlocked	0	.255
Non-Oil Exports (in logs)(1975)	18.26675	16.17728
Non-Oil Exports (in logs)(1980)	17.13557	16.37263
Non-Oil Exports (in logs)(1985)	13.71443	15.55716
Burkina Faso		
Area (in logs)	12.52161	11.70223
Weighted distance (in logs)	9.13324	9.479883
English speaking dummy	0	0
GDP (in logs)	7.691059	7.548587
landlocked	1	.778
Non-Oil Exports (in logs)(1975)	13.9029	13.37099
Non-Oil Exports (in logs)(1980)	12.73048	13.64804
Non-Oil Exports (in logs)(1985)	13.61841	13.83259
Burundi		
Area (in logs)	10.23401	10.56922
Weighted distance (in logs)	9.47576	9.45382
English speaking dummy	0	.087
GDP (in logs)	6.744436	7.164733
landlocked	1	.264
Non-Oil Exports (in logs)(1975)	16.67131	16.27663
Non-Oil Exports (in logs)(1980)	17.55539	16.72552
Non-Oil Exports (in logs)(1985)	13.99697	15.90799
Congo, Rep.		
Area (in logs)	12.74257	10.98369
Weighted distance (in logs)	9.375017	9.375891
English speaking dummy	0	.243
GDP (in logs)	7.508524	7.508613
landlocked	0	.003
Non-Oil Exports (in logs)(1975)	15.31461	15.00563
Non-Oil Exports (in logs)(1980)	15.91673	15.91593
Non-Oil Exports (in logs)(1985)	16.46276	16.47168
Gabon		
Area (in logs)	12.4975	11.94598
Weighted distance (in logs)	9.319605	9.319297
English speaking dummy	0	.349
GDP (in logs)	8.268391	8.648416
landlocked	0	0
Non-Oil Exports (in logs)(1975)	17.11628	16.77364
Non-Oil Exports (in logs)(1980)	16.62189	16.62224
Non-Oil Exports (in logs)(1985)	15.88529	16.51188
Gambia		
Area (in logs)	9.332115	12.35631
Weighted distance (in logs)	8.981077	9.503884
English speaking dummy	1	.009
GDP (in logs)	5.575891	7.065357
landlocked	0	.991
Non-Oil Exports (in logs)(1975)	11.68043	12.93458
Non-Oil Exports (in logs)(1980)	11.69505	13.96498
Non-Oil Exports (in logs)(1985)	12.76827	13.06086
Ghana		
Area (in logs)	12.38228	11.73372
Weighted distance (in logs)	9.188511	9.461557
English speaking dummy	1	.634
GDP (in logs)	8.510709	8.633171
landlocked	0	0

Non-Oil Exports (in logs)(1975)	18.67589	18.56961
Non-Oil Exports (in logs)(1980)	18.94961	18.99878
Non-Oil Exports (in logs)(1985)	18.18993	18.62224
Kenya		
Area (in logs)	13.27534	13.16928
Weighted distance (in logs)	9.50872	9.467534
English speaking dummy	1	.911
GDP (in logs)	8.885896	8.912188
landlocked	0	0
Non-Oil Exports (in logs)(1975)	17.40041	17.40064
Non-Oil Exports (in logs)(1980)	17.88505	18.15704
Non-Oil Exports (in logs)(1985)	18.41648	18.21862
Mauritius		
Area (in logs)	7.623153	7.614988
Weighted distance (in logs)	9.709031	9.529411
English speaking dummy	1	.522
GDP (in logs)	7.494572	8.137017
landlocked	0	0
Non-Oil Exports (in logs)(1975)	16.62627	16.6088
Non-Oil Exports (in logs)(1980)	17.81976	17.76795
Non-Oil Exports (in logs)(1985)	18.1665	18.42038
Nigeria		
Area (in logs)	13.73622	13.08063
Weighted distance (in logs)	9.231462	9.209185
English speaking dummy	1	.44
GDP (in logs)	10.37557	8.488635
landlocked	0	.56
Non-Oil Exports (in logs)(1975)	17.36125	17.20326
Non-Oil Exports (in logs)(1980)	18.48723	18.08047
Non-Oil Exports (in logs)(1985)	17.36996	17.42308
Sierra Leone		
Area (in logs)	11.20267	10.86679
Weighted distance (in logs)	9.06034	9.295624
English speaking dummy	1	.036
GDP (in logs)	6.716387	7.677599
landlocked	0	.322
Non-Oil Exports (in logs)(1975)	17.5279	17.39392
Non-Oil Exports (in logs)(1980)	18.19774	17.83781
Non-Oil Exports (in logs)(1985)	16.5965	16.99254
South Africa		
Area (in logs)	14.01429	13.8634
Weighted distance (in logs)	9.576275	9.47398
English speaking dummy	1	.999
GDP (in logs)	11.41033	11.40907
landlocked	0	0
Non-Oil Exports (in logs)(1975)	20.61711	20.15076
Non-Oil Exports (in logs)(1980)	21.97994	20.97831
Non-Oil Exports (in logs)(1985)	21.49369	21.30116

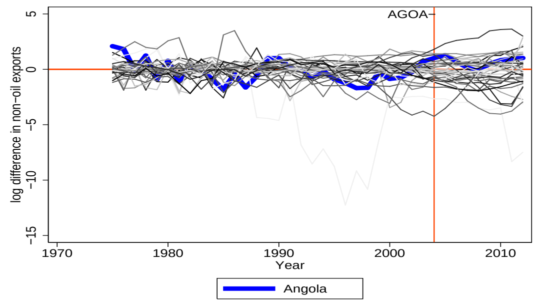
Table C.25: Treated vs. Synthetic predictors for Non-Oil exports

Predictor	Treated	Synthetic
Angola		
Area (in logs)	14.03601	9.184533
Weighted distance (in logs)	9.405381	9.189354
English speaking dummy	0	.066
GDP (in logs)	8.79734	9.64536
Landlocked	0	0
Total exports (in logs)(1975)	19.86865	19.47133
Total exports (in logs)(1980)	20.14122	20.12551
Total exports (in logs)(1985)	20.81353	20.75433
Burkina Faso		
Area (in logs)	12.52161	12.60728
Weighted distance (in logs)	9.13324	9.462064
English speaking dummy	0	0
GDP (in logs)	7.691059	7.191892
Landlocked	1	.99
Total exports (in logs)(1975)	13.9029	13.15612
Total exports (in logs)(1980)	12.73051	14.06393
Total exports (in logs)(1985)	13.61841	13.40664
Burundi		
Area (in logs)	10.23401	10.62992
Weighted distance (in logs)	9.47576	9.457086
English speaking dummy	0	.191
GDP (in logs)	6.744436	7.12449
Landlocked	1	.315
Total exports (in logs)(1975)	16.85745	15.99562
Total exports (in logs)(1980)	17.5554	16.85498
Total exports (in logs)(1985)	13.99697	15.51064
Congo, Rep.		
Area (in logs)	12.74257	5.395324
Weighted distance (in logs)	9.375017	9.315714
English speaking dummy	0	.113
GDP (in logs)	7.508524	8.053666
Landlocked	0	0
Total exports (in logs)(1975)	16.75668	17.08317
Total exports (in logs)(1980)	18.37171	18.9414
Total exports (in logs)(1985)	20.28569	19.75685
Gabon		
Area (in logs)	12.4975	11.03661
Weighted distance (in logs)	9.319605	9.28046
English speaking dummy	0	.001
GDP (in logs)	8.268391	9.302008
Landlocked	0	0
Total exports (in logs)(1975)	19.09818	19.02217

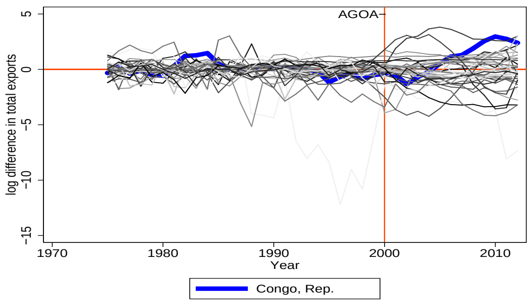
Total exports (in logs)(1980)	19.49569	19.41719
Total exports (in logs)(1985)	20.07365	19.98155
Gambia		
Area (in logs)	9.332115	12.27546
Weighted distance (in logs)	8.981077	9.499963
English speaking dummy	1	.048
GDP (in logs)	5.575891	6.991293
Landlocked	0	.952
Total exports (in logs)(1975)	11.68043	13.00374
Total exports (in logs)(1980)	11.70245	14.08566
Total exports (in logs)(1985)	12.76827	13.2007
Ghana		
Area (in logs)	12.38228	11.68854
Weighted distance (in logs)	9.188511	9.188091
English speaking dummy	1	.351
GDP (in logs)	8.510709	8.517252
Landlocked	0	0
Total exports (in logs)(1975)	18.82976	18.74643
Total exports (in logs)(1980)	19.18319	19.18503
Total exports (in logs)(1985)	18.3704	18.53771
Kenya		
Area (in logs)	13.27534	12.90265
Weighted distance (in logs)	9.50872	9.413002
English speaking dummy	1	.65
GDP (in logs)	8.885896	9.335034
Landlocked	0	0
Total exports (in logs)(1975)	17.40041	17.39955
Total exports (in logs)(1980)	17.8851	17.89919
Total exports (in logs)(1985)	18.41648	18.41522
Mauritius		
Area (in logs)	7.623153	7.623906
Weighted distance (in logs)	9.709031	9.388441
English speaking dummy	1	.672
GDP (in logs)	7.494572	7.496196
Landlocked	0	0
Total exports (in logs)(1975)	16.62627	16.75979
Total exports (in logs)(1980)	17.81979	18.17813
Total exports (in logs)(1985)	18.1665	18.00514
Nigeria		
Area (in logs)	13.73622	14.58674
Weighted distance (in logs)	9.231462	9.212382
English speaking dummy	1	0
GDP (in logs)	10.37557	11.2981
Landlocked	0	0
Total exports (in logs)(1975)	21.91141	21.48024
Total exports (in logs)(1980)	23.14949	23.06361
Total exports (in logs)(1985)	21.85711	21.53019
Sierra Leone		
Area (in logs)	11.20267	10.59294
Weighted distance (in logs)	9.06034	9.43608
English speaking dummy	1	.288
GDP (in logs)	6.716387	7.395782
Landlocked	0	0
Total exports (in logs)(1975)	17.5279	17.52749
Total exports (in logs)(1980)	18.19775	17.75518
Total exports (in logs)(1985)	16.66466	17.03452
South Africa		
Area (in logs)	14.01429	14.01257
Weighted distance (in logs)	9.576275	9.456192
English speaking dummy	1	.093
GDP (in logs)	11.41033	11.11992
Landlocked	0	0
Total exports (in logs)(1975)	20.62823	20.62665
Total exports (in logs)(1980)	21.98991	21.98892
Total exports (in logs)(1985)	21.53061	21.52894



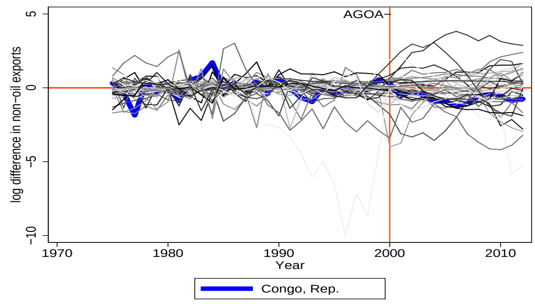
(a) Total: Angola



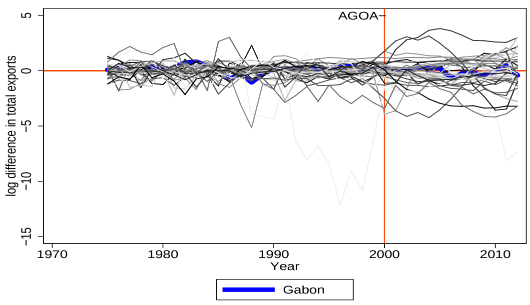
(b) Non-Oil: Angola



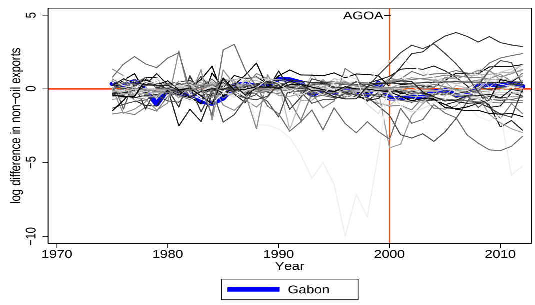
(c) Total: Congo, Rep



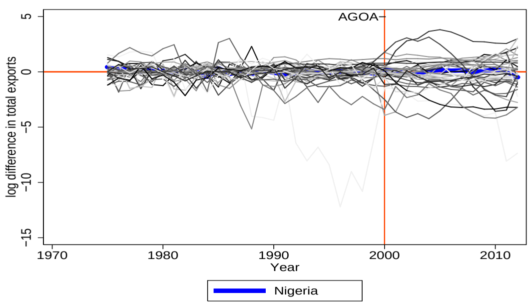
(d) Non-Oil: Congo, Rep



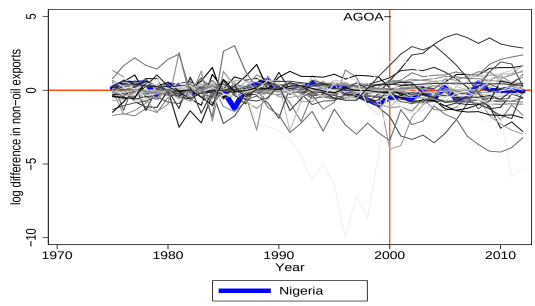
(e) Total: Gabon



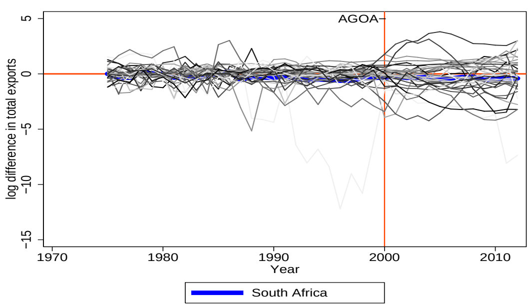
(f) Non-Oil: Gabon



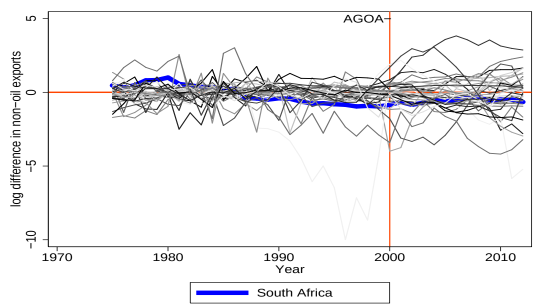
(g) Total: Nigeria



(h) Non-Oil: Nigeria



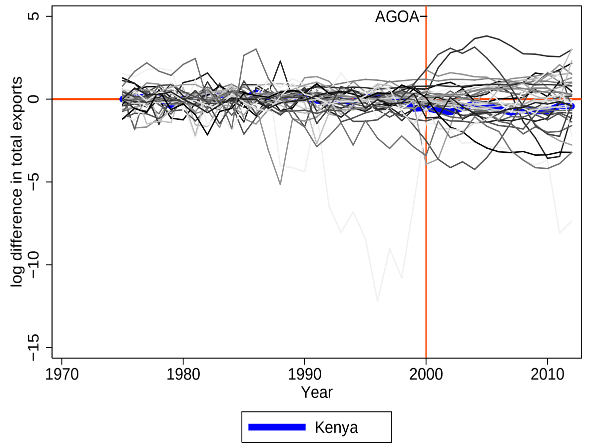
(i) Total: South Africa



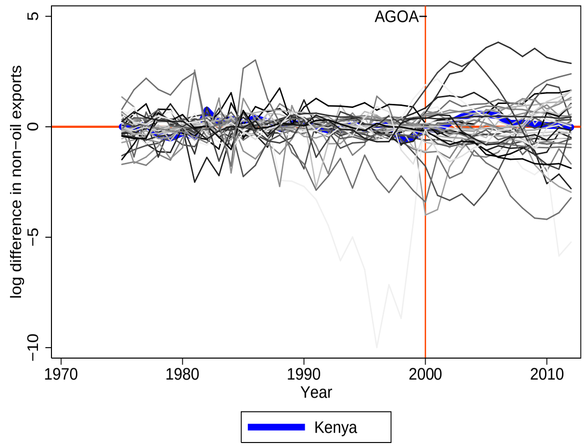
(j) Non-Oil: South Africa

All 38 control countries are shown in the graph in addition to the series of the treated country.

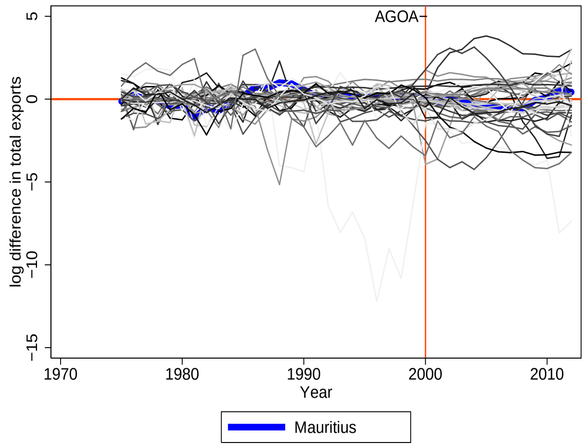
Figure C.3: *Export gaps between treated and placebo gaps in all 38 control countries (Top 5 based on total exports)*



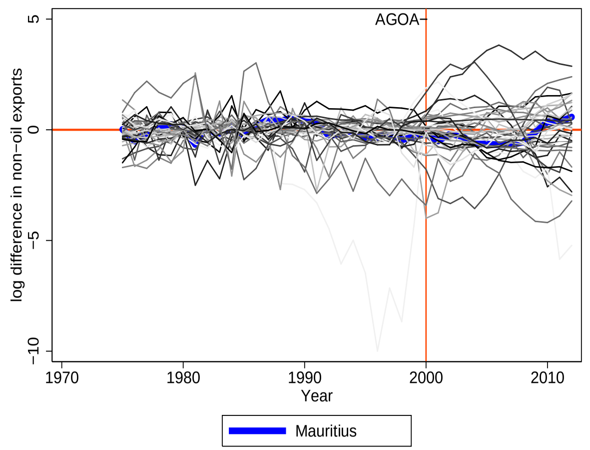
(a) Total: Kenya



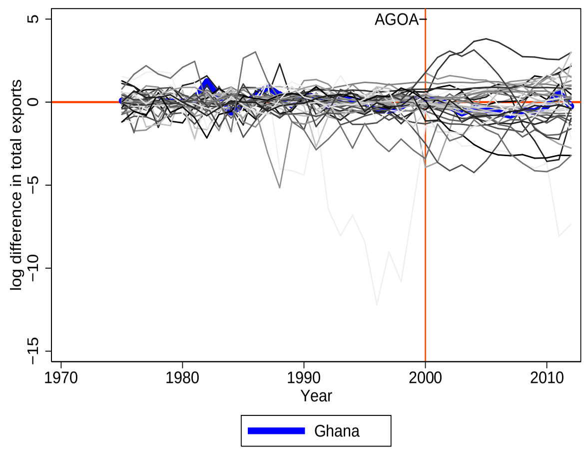
(b) Non-Oil: Kenya



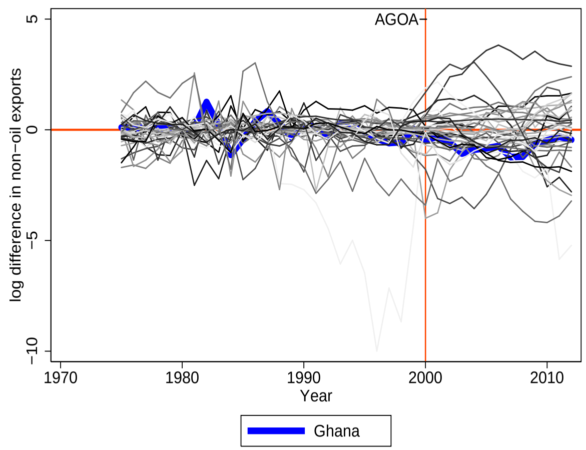
(c) Total: Mauritius



(d) Non-Oil: Mauritius



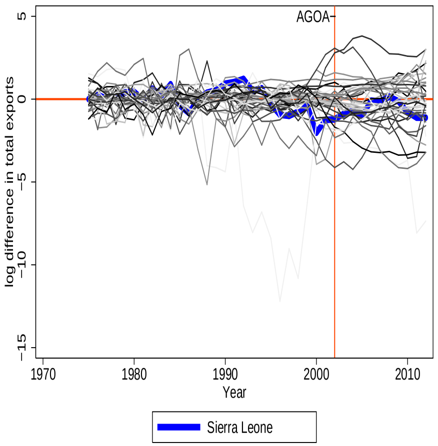
(e) Total: Ghana



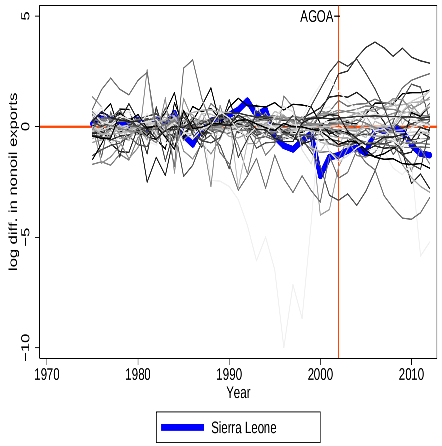
(f) Non-Oil: Ghana

All 38 control countries are shown in the graph in addition to the series of the treated country.

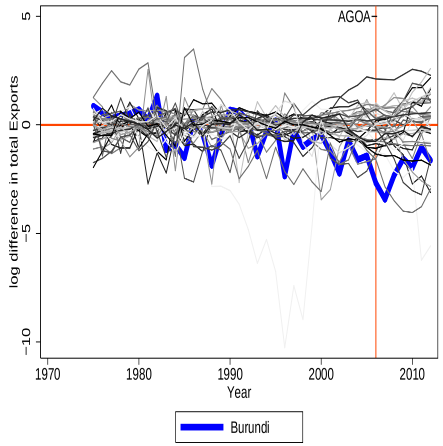
Figure C.4: *Export gaps between treated and placebo gaps in all 38 control countries (top 5 countries based on Non-oil exports)*



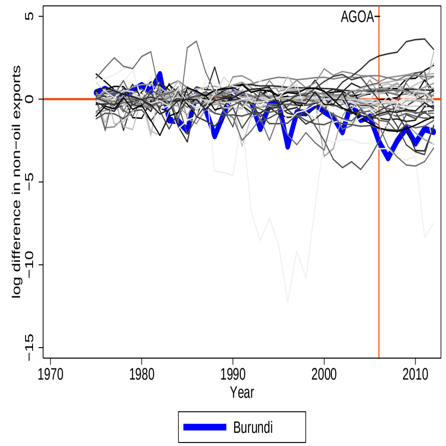
(a) Total: Sierra Leone



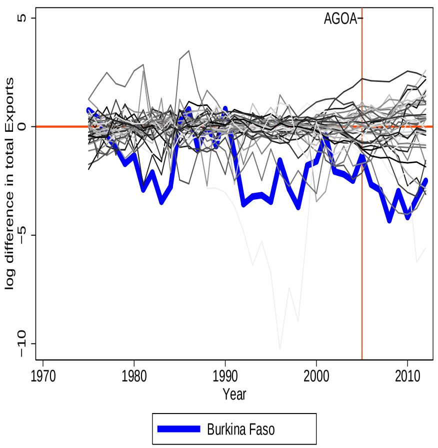
(b) Non-Oil: Sierra Leone



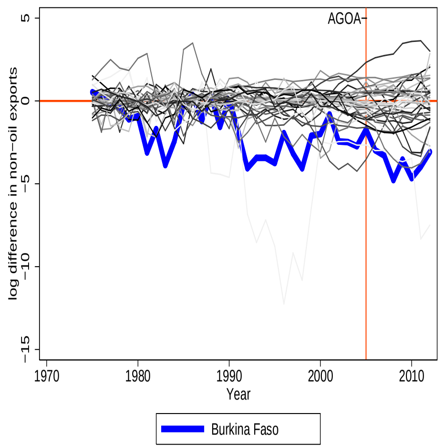
(c) Total: Burundi



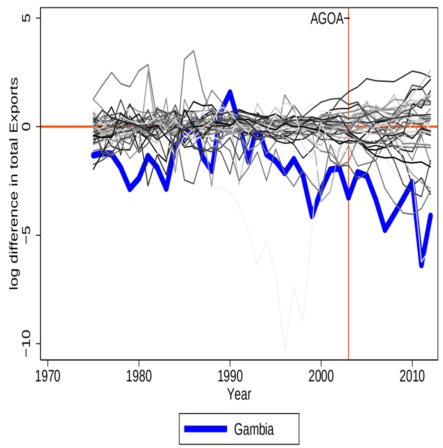
(d) Non-Oil: Burundi



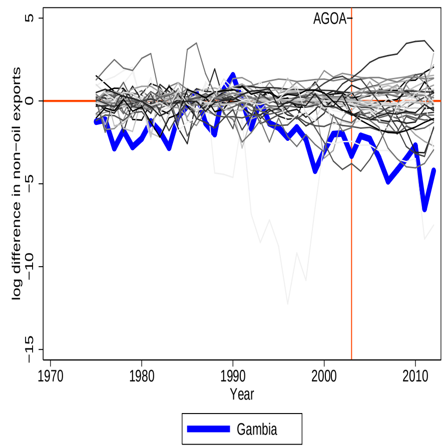
(e) Total: Burkina



(f) Non-Oil: Burkina



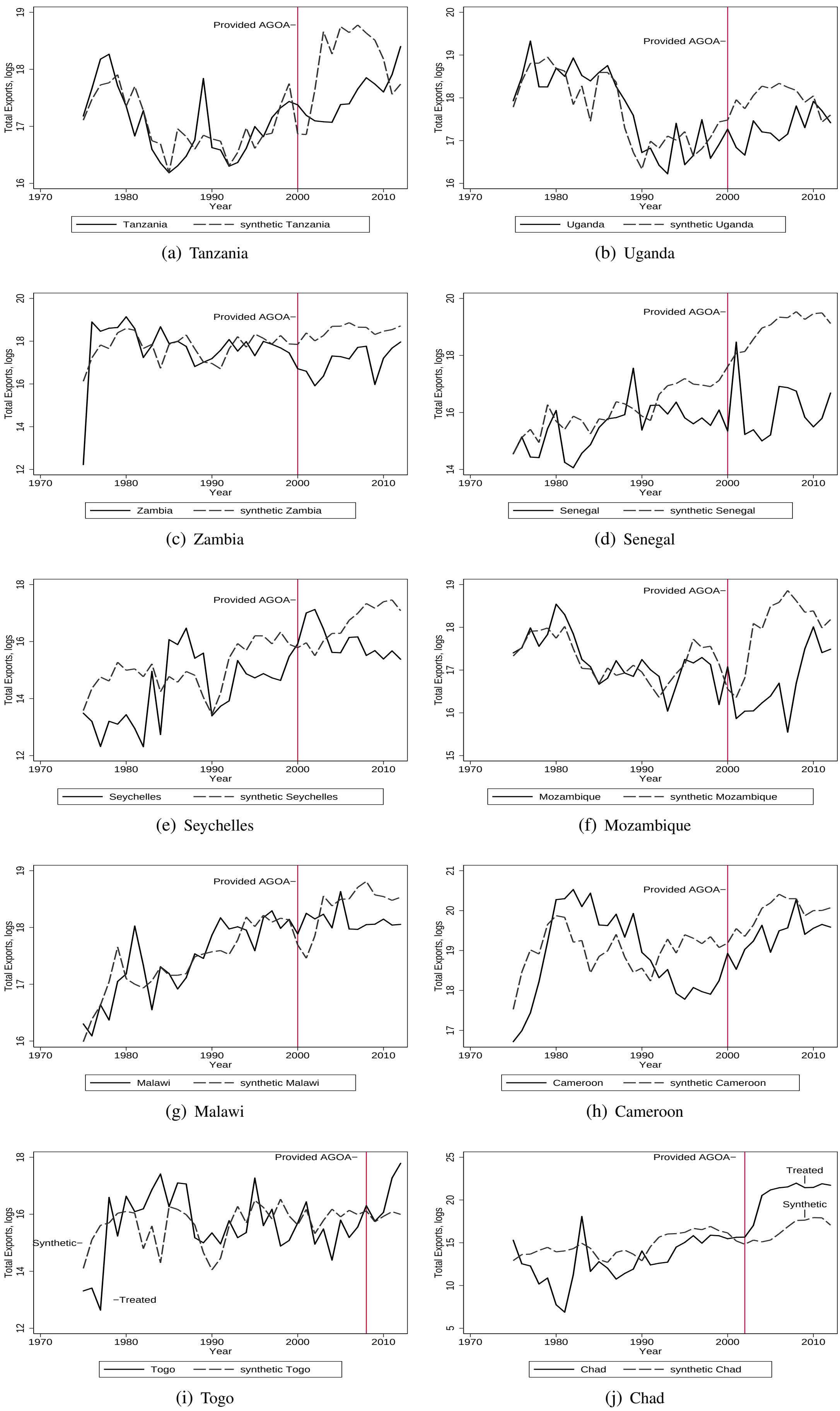
(g) Total: Gambia



(h) Non-Oil: Gambia

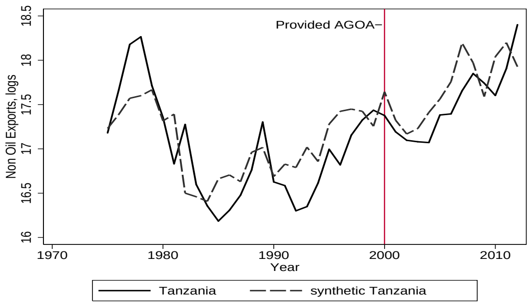
All 38 control countries are shown in the graph in addition to the series of the treated country.

Figure C.5: *Export gaps between treated and placebo gaps in all 38 countries, bottom five countries and Sierra Leone*

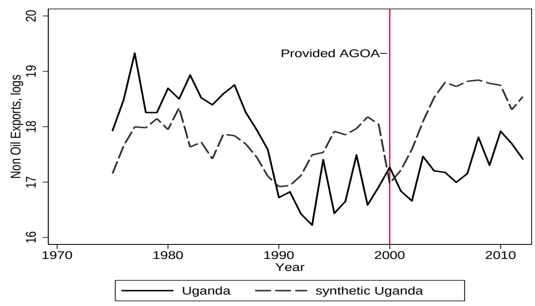


Showing graphs for countries not shown or discussed in the main text. Continuous solid line is treated and dash-line is the synthetic country

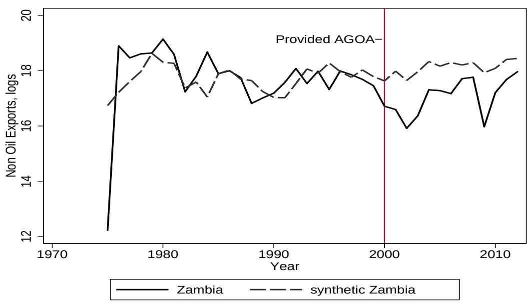
Figure C.6: *Trends in exports, treated versus synthetic—remaining AGOA countries: total exports*



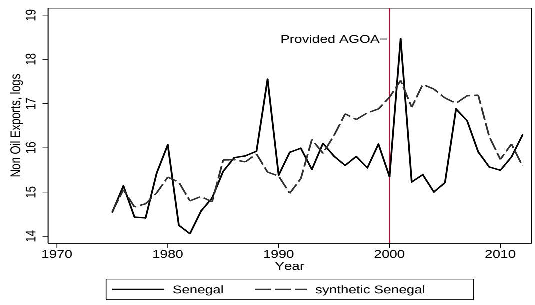
(a) Tanzania



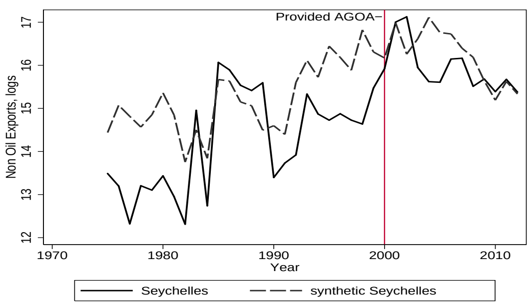
(b) Uganda



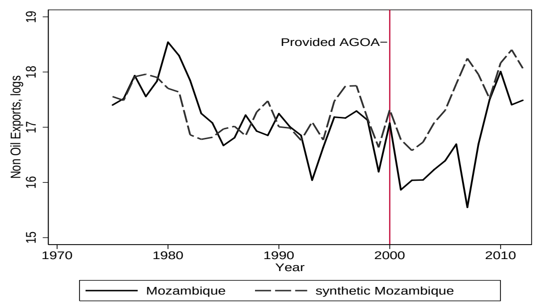
(c) Zambia



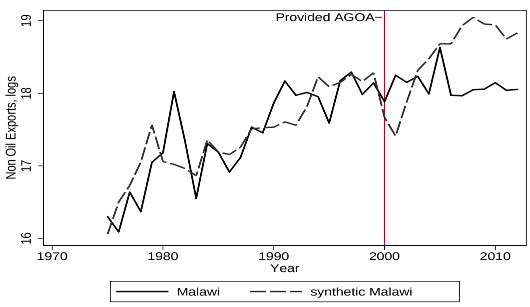
(d) Senegal



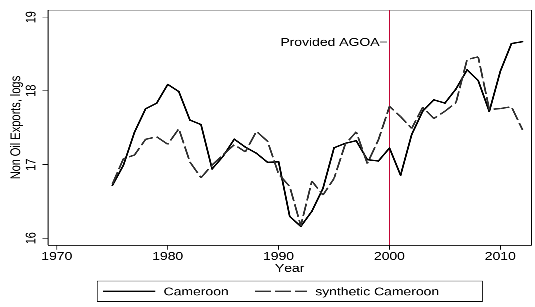
(e) Seychelles



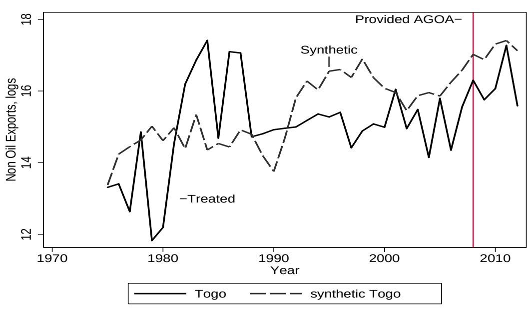
(f) Mozambique



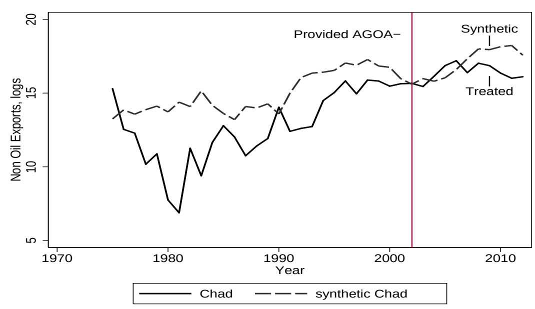
(g) Malawi



(h) Cameroon



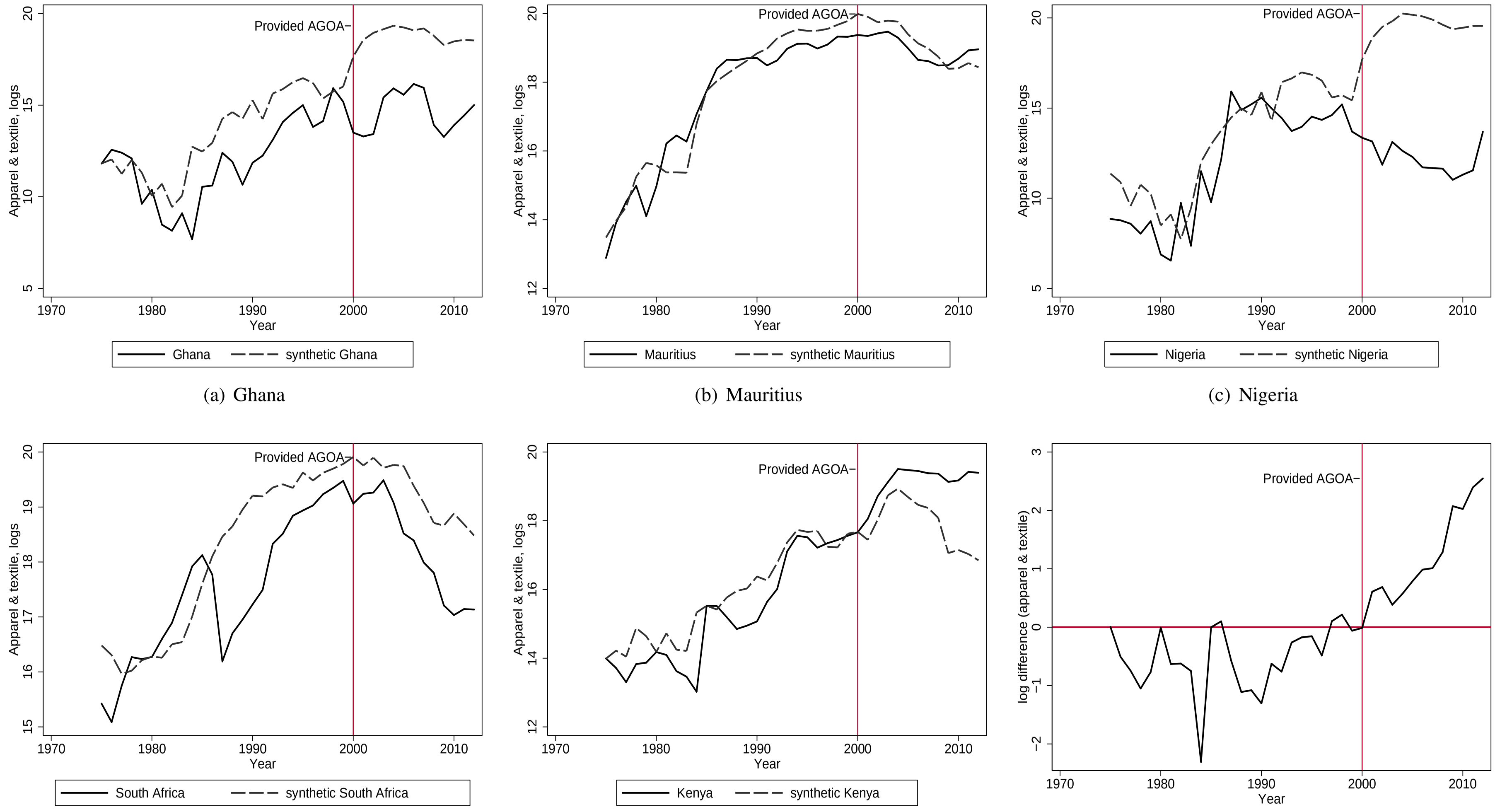
(i) Togo



(j) Chad

Showing graphs for countries not shown or discussed in the main text. Continuous solid line is treated and dash-line is the synthetic country

Figure C.7: *Trends in exports: treated versus synthetic, remaining AGOA countries: non-oil exports*



(a) Ghana (b) Mauritius (c) Nigeria

(d) South Africa (e) Kenya (f) Kenya

The panels above show apparel & textile exports to the USA. Selected countries from the top five AGOA exporters based on mean total exports for the period 2001–2012 are shown. The apparel & textile products are summed based upon HS 50–63 products. In almost all panels, the pre-AGOA trends of the treated country and it synthetic counterpart are not perfect. Source: Author's elaboration of data obtained from the UN Comtrade database

Figure C.8: *Trends in apparel & textile exports: treated versus synthetic, top five exporters*

Appendix D

Appendix to Chapter Five

In this appendix we provide further results. However, due to space considerations we provide what we consider to be the key additional results. We are happy to provide further information and additional tables and figures if requested.

Cross-Section Analysis

Summary information

Table D.1: AGOA (All) Countries under common support

Angola	Cote d'Ivoire	Madagascar	Senegal
Benin	Djibouti	Malawi	Seychelles
Botswana	Ethiopia(excludes Eritrea)	Mali	Sierra Leone
Burkina Faso	Gabon	Mauritania	South Africa
Burundi	Gambia, The	Mauritius	Swaziland
Cameroon	Ghana	Mozambique	Tanzania
Cape Verde	Guinea	Namibia	Togo
Chad	Guinea Bissau	Niger	Uganda
Comoro Is.	Kenya	Nigeria	Zambia
Congo (DROC)	Lesotho	Rwanda	
Congo (ROC)	Liberia	Sao Tome Principe	

Table D.2: AGOA (In & Out) Countries under common support

Cent. Af. Rep.	Guinea Bissau
Congo (DROC)	Madagascar
Cote d'Ivoire	Mali
Eritrea	Mauritania
Guinea	Niger

Table D.3: AGOA (also EBA) Countries under common support

Angola	Mozambique
Benin	Rwanda
Cape Verde	Sao Tome Principe
Chad	Senegal
Djibouti	Sierra Leone
Ethiopia(excludes Eritrea)	Tanzania
Gambia, The	Uganda
Lesotho	Zambia
Malawi	

Table D.4: AGOA (Always) Countries under common support

Angola	Ethiopia(excludes Eritrea)	Mauritius	Seychelles
Benin	Gabon	Mozambique	Sierra Leone
Botswana	Gambia, The	Namibia	South Africa
Cameroon	Ghana	Nigeria	Swaziland
Cape Verde	Kenya	Rwanda	Tanzania
Chad	Lesotho	Sao Tome & Principe	Uganda
Congo (ROC)	Malawi	Senegal	Zambia
Djibouti			

Table D.5: Non–AGOA Countries under common support

Afghanistan	Cent. Af. Rep.	Laos	P. N. Guinea	Sri Lanka
Algeria	Chile	Lebanon	Pakistan	Tunisia
Argentina	Eritrea	Libya	Palau	Uruguay
Bangladesh	India	Malaysia	Peru	Vietnam
Bhutan	Iran, Islamic Rep.	Maldives	Philippines	Yemen
Brazil	Jordan	Mongolia	Solomon Is.	Zimbabwe
Cambodia	Kiribati	Nepal	Somalia	

Table D.6: Non–AGOA Countries outside common support

Anguila	Colombia	Fr S & Ant land	Malta	Paraguay	Syrian Arab Republic
Antigua and Barbuda	Cook Islands	French Guiana	Marshall Is	Pitcairn Is	Taiwan, China
Aruba	Costa Rica	French Polynesia	Martinique	Qatar	Tokelau Is
Bahamas, The	Cuba	Grenada	Mayotte	Reunion	Tonga
Bahrain	Curacao	Guatemala	Montserrat	Samoa	Trinidad and Tobago
Barbados	Dominica	Guyana	Morocco	Saudi Arabia	Turks and Caicos Isl.
Belize	Dominican Republic	Haiti	Nauru	Singapore	Tuvalu
Bolivia	East Timor	Heard & McDn Is	Netherlands Antilles	Sint Maarten	United Arab Emirates
Br Virgin Is	Ecuador	Honduras	New Caledonia	St Helena	Vanuatu
Br Indian O Ter	Egypt, Arab Rep.	Hong Kong	Nicaragua	St Pierre & Miq	Vatican City
Brunei	El Salvador	Indonesia	Niue	St. Kitts and Nevis	Venezuela
Burma (Myanmar)	Eq Guinea	Iraq	Norfolk Is	St. Lucia	Wallis & Futuna
Cayman Is	F St Micronesia	Jamaica	North Korea	St. Vincent and the Grenadines	West Bank
Christmas Is	Falkland Is	Kuwait	Oman	Suriname	Western Sahara
Cocos Is	Fiji	Macao	Panama		

Table D.7: Summary Statistics–All AGOA

	Non-agoa count	p25	p50	p95	mean	agoa count	p25	p50	p95	mean	Total count	p25	p50	p95	mean
Exports to USA	27	8.05e+07	3.68e+08	2.26e+10	4.42e+09	37	1.02e+07	7.05e+07	6.61e+09	1.03e+09	64	1.37e+07	1.26e+08	1.98e+10	2.46e+09
AMDS Exports to USA	27	6.44e+05	4.23e+06	1.08e+09	2.37e+08	37	1.68e+05	9.69e+05	7.45e+07	1.16e+07	64	2.63e+05	2.26e+06	5.70e+08	1.07e+08
FBTWP Exports to USA	27	2.86e+05	8.83e+06	1.19e+09	2.96e+08	37	1.95e+05	7.45e+05	1.72e+08	2.59e+07	64	2.43e+05	2.41e+06	8.12e+08	1.40e+08
EI Exports to USA	27	4.11e+06	3.31e+07	5.94e+09	1.02e+09	37	6.59e+05	4.57e+06	3.04e+09	8.62e+08	64	9.31e+05	1.16e+07	5.35e+09	9.28e+08
CPR Exports to USA	27	5.81e+04	7.33e+06	1.54e+09	2.51e+08	37	3.90e+04	2.52e+05	9.35e+07	1.92e+07	64	5.11e+04	3.99e+05	5.32e+08	1.17e+08
TALF Exports to USA	27	9.01e+04	6.04e+07	3.01e+09	7.75e+08	37	4.26e+04	2.70e+05	2.28e+08	3.62e+07	64	4.91e+04	1.31e+06	1.94e+09	3.48e+08
ISOM Exports to USA	27	4.34e+04	8.97e+05	2.09e+09	3.36e+08	37	2.02e+04	9.98e+04	9.94e+07	4.32e+07	64	3.05e+04	4.61e+05	1.29e+09	1.67e+08
METE Exports to USA	27	1.96e+05	3.23e+06	5.94e+09	1.35e+09	37	1.16e+05	2.19e+05	5.30e+06	3.41e+07	64	1.37e+05	3.74e+05	2.23e+09	5.91e+08
OI Exports to USA	27	4.57e+05	3.51e+06	6.61e+08	1.53e+08	37	1.44e+05	5.28e+05	6.81e+06	3.15e+06	64	1.76e+05	1.35e+06	5.86e+08	6.62e+07
USA/EU	27	0.1581	0.5660	2.0062	0.7930	37	0.0663	0.1362	3.9483	0.7856	64	0.0804	0.2278	3.5025	0.7887
USA/EU, AMDS	27	0.0854	0.2081	1.3579	0.3969	37	0.0181	0.0488	0.4580	0.1068	64	0.0221	0.0719	0.9048	0.2292
USA/EU, FBTWP	27	0.1296	0.3149	1.3840	0.4446	37	0.0211	0.0391	1.7503	0.4690	64	0.0296	0.0887	1.3840	0.4587
USA/EU, EI	27	0.3169	1.3645	16.1640	3.3082	37	0.0950	0.2224	17.2291	1.9015	64	0.1520	0.4287	16.1640	2.4950
USA/EU, TALF	27	0.0664	0.3663	2.5997	0.6471	37	0.0473	0.1055	4.8298	0.5229	64	0.0548	0.1413	2.7226	0.5753
USA/EU, TALF	27	0.0455	0.4696	4.5841	2.9491	37	0.0240	0.0954	27.8011	5.8008	64	0.0288	0.1614	9.5500	4.5978
USA/EU, ISOM	27	0.0334	0.0963	0.8442	0.2722	37	0.0092	0.0422	1.1217	0.2972	64	0.0156	0.0743	0.8740	0.2866
USA/EU, METE	27	0.0483	0.1868	1.4895	0.3707	37	0.0277	0.0620	0.6201	0.1270	64	0.0341	0.0833	0.9602	0.2298
USA/EU, OI	27	0.3393	0.6484	2.2687	0.8823	37	0.1652	0.2677	3.8974	0.7988	64	0.1851	0.4876	2.2687	0.8340
USA/ROW	27	0.0574	0.2050	1.3851	0.3614	37	0.0298	0.1548	6.1013	0.8745	64	0.0356	0.1673	1.3851	0.6581

AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries.

Table D.8: Summary Statistics–EBA & AGOA at the same time

	0 count	p25	p50	p95	mean	1 count	p25	p50	p95	mean	Total count	p25	p50	p95	mean
Exports to USA	49	8.05e+07	2.40e+08	2.21e+10	3.17e+09	15	2.02e+06	1.93e+07	1.43e+09	1.36e+08	64	1.37e+07	1.26e+08	1.98e+10	2.46e+09
AMDS Exports to USA	49	2.70e+05	2.37e+06	1.07e+09	1.37e+08	15	2.56e+05	9.78e+05	6.06e+07	8.61e+06	64	2.63e+05	2.26e+06	5.70e+08	1.07e+08
FBTWP Exports to USA	49	2.86e+05	6.46e+06	1.10e+09	1.83e+08	15	1.25e+05	3.27e+05	7.43e+06	1.17e+06	64	2.43e+05	2.41e+06	8.12e+08	1.40e+08
EI Exports to USA	49	4.11e+06	3.17e+07	5.94e+09	1.18e+09	15	3.15e+04	6.59e+05	1.58e+09	1.08e+08	64	9.31e+05	1.16e+07	5.35e+09	9.28e+08
CPR Exports to USA	49	1.15e+05	1.99e+06	1.37e+09	1.53e+08	15	2.38e+04	4.14e+04	5.98e+05	1.34e+05	64	5.11e+04	3.99e+05	5.32e+08	1.17e+08
TALF Exports to USA	49	7.65e+04	4.22e+06	2.96e+09	4.47e+08	15	4.17e+04	2.28e+05	3.63e+08	2.50e+07	64	4.91e+04	1.31e+06	1.94e+09	3.48e+08
ISOM Exports to USA	49	4.66e+04	5.77e+05	1.71e+09	2.17e+08	15	1.59e+04	3.91e+04	2.30e+07	3.77e+06	64	3.05e+04	4.61e+05	1.29e+09	1.67e+08
METE Exports to USA	49	2.12e+05	8.00e+05	5.47e+09	7.72e+08	15	5.73e+04	1.16e+05	1.14e+06	2.25e+05	64	1.37e+05	3.74e+05	2.23e+09	5.91e+08
OI Exports to USA	49	4.57e+05	2.59e+06	6.49e+08	8.63e+07	15	5.90e+04	1.52e+05	1.20e+06	3.80e+05	64	1.76e+05	1.35e+06	5.86e+08	6.62e+07
USA/EU	49	0.1317	0.2914	2.5233	0.6783	15	0.0522	0.0781	12.1125	1.1496	64	0.0804	0.2278	3.5025	0.7887
USA/EU, AMDS	49	0.0181	0.0854	1.1498	0.2534	15	0.0355	0.0666	0.8543	0.1503	64	0.0221	0.0719	0.9048	0.2292
USA/EU, FBTWP	49	0.0372	0.1296	0.9229	0.2794	15	0.0134	0.0338	13.2278	1.0446	64	0.0296	0.0887	1.3840	0.4587
USA/EU, EI	49	0.2076	0.6193	16.1640	2.6502	15	0.0393	0.0994	24.1962	1.9878	64	0.1520	0.4287	16.1640	2.4950
USA/EU, TALF	49	0.0653	0.1600	2.5997	0.5657	15	0.0288	0.0758	4.8646	0.6066	64	0.0548	0.1413	2.7226	0.5753
USA/EU, TALF	49	0.0304	0.2705	9.5500	2.5645	15	0.0168	0.0876	167.4059	11.2398	64	0.0288	0.1614	9.5500	4.5978
USA/EU, ISOM	49	0.0200	0.0711	0.8442	0.2989	15	0.0092	0.0791	1.1217	0.2465	64	0.0156	0.0743	0.8740	0.2866
USA/EU, METE	49	0.0395	0.1082	1.1408	0.2730	15	0.0137	0.0543	0.6201	0.0888	64	0.0341	0.0833	0.9602	0.2298
USA/EU, OI	49	0.1973	0.5995	2.2687	0.9028	15	0.1713	0.2316	3.8974	0.6094	64	0.1851	0.4876	2.2687	0.8340
USA/ROW	49	0.0661	0.2208	1.3850	0.3784	15	0.0130	0.0476	16.1682	1.5716	64	0.0356	0.1673	1.3851	0.6581

AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries.

Table D.9: Summary Statistics–Always had AGOA

	0 count	p25	p50	p95	mean	1 count	p25	p50	p95	mean	Total count	p25	p50	p95	mean
Exports to USA	37	1.96e+07	1.93e+08	2.26e+10	3.27e+09	27	1.02e+07	7.05e+07	6.61e+09	1.35e+09	64	1.37e+07	1.26e+08	1.98e+10	2.46e+09
AMDS Exports to USA	37	2.77e+05	1.95e+06	1.08e+09	1.76e+08	27	2.56e+05	2.32e+06	6.06e+07	1.28e+07	64	2.63e+05	2.26e+06	5.70e+08	1.07e+08
FBTWP Exports to USA	37	2.86e+05	3.42e+06	1.19e+09	2.31e+08	27	1.75e+05	1.16e+06	9.84e+07	1.51e+07	64	2.43e+05	2.41e+06	8.12e+08	1.40e+08
EI Exports to USA	37	4.11e+06	2.74e+07	5.94e+09	7.57e+08	27	9.85e+04	3.20e+06	3.04e+09	1.16e+09	64	9.31e+05	1.16e+07	5.35e+09	9.28e+08
CPR Exports to USA	37	8.18e+04	1.68e+06	1.54e+09	1.86e+08	27	2.69e+04	2.31e+05	2.28e+07	2.21e+07	64	5.11e+04	3.99e+05	5.32e+08	1.17e+08
TALF Exports to USA	37	4.26e+04	4.19e+06	3.01e+09	5.72e+08	27	4.93e+04	1.09e+06	2.21e+08	4.11e+07	64	4.91e+04	1.31e+06	1.94e+09	3.48e+08
ISOM Exports to USA	37	3.36e+04	5.49e+05	2.09e+09	2.48e+08	27	2.02e+04	4.49e+05	9.94e+07	5.58e+07	64	3.05e+04	4.61e+05	1.29e+09	1.67e+08
METE Exports to USA	37	1.84e+05	7.08e+05	5.94e+09	9.88e+08	27	9.28e+04	2.19e+05	5.30e+06	4.65e+07	64	1.37e+05	3.74e+05	2.23e+09	5.91e+08
OI Exports to USA	37	3.11e+05	2.47e+06	6.61e+08	1.12e+08	27	8.94e+04	5.28e+05	6.81e+06	3.86e+06	64	1.76e+05	1.35e+06	5.86e+08	6.62e+07
USA/EU	37	0.1362	0.3704	2.0062	0.6248	27	0.0737	0.1317	3.9483	1.0133	64	0.0804	0.2278	3.5025	0.7887
USA/EU, AMDS	37	0.0316	0.1447	1.3579	0.3113	27	0.0192	0.0646	0.4580	0.1166	64	0.0221	0.0719	0.9048	0.2292
USA/EU, FBTWP	37	0.0612	0.2171	1.3840	0.3514	27	0.0171	0.0452	1.7503	0.6058	64	0.0296	0.0887	1.3840	0.4587
USA/EU, EI	37	0.2238	1.2372	17.2291	3.0697	27	0.0747	0.2216	5.0845	1.7074	64	0.1520	0.4287	16.1640	2.4950
USA/EU, TALF	37	0.0634	0.1706	4.8298	0.6683	27	0.0473	0.1126	2.7226	0.4477	64	0.0548	0.1413	2.7226	0.5753
USA/EU, TALF	37	0.0276	0.2044	4.5841	2.1838	27	0.0478	0.1518	27.8011	7.9059	64	0.0288	0.1614	9.5500	4.5978
USA/EU, ISOM	37	0.0200	0.0547	0.8442	0.2130	27	0.0092	0.0791	1.1217	0.3875	64	0.0156	0.0743	0.8740	0.2866
USA/EU, METE	37	0.0500	0.1390	1.4895	0.2912	27	0.0266	0.0543	0.6201	0.1457	64	0.0341	0.0833	0.9602	0.2298
USA/EU, OI	37	0.2958	0.6484	3.1375	0.9579	27	0.1684	0.2677	2.0985	0.6642	64	0.1851	0.4876	2.2687	0.8340
USA/ROW	37	0.0365	0.2050	1.3851	0.3512	27	0.0348	0.1548	6.1013	1.0786	64	0.0356	0.1673	1.3851	0.6581

AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries.

Table D.10: Summary Statistics–In & Out of AGOA

	0 count	p25	p50	p95	mean	1 count	p25	p50	p95	mean	Total count	p25	p50	p95	mean
Exports to USA	55	1.69e+07	1.48e+08	2.21e+10	2.84e+09	9	4.57e+06	3.96e+07	7.84e+08	1.68e+08	64	1.37e+07	1.26e+08	1.98e+10	2.46e+09
AMDS Exports to USA	55	3.81e+05	2.84e+06	1.07e+09	1.23e+08	9	1.40e+05	2.49e+05	7.45e+07	9.44e+06	64	2.63e+05	2.26e+06	5.70e+08	1.07e+08
FBTWP Exports to USA	55	2.23e+05	3.30e+06	1.10e+09	1.53e+08	9	3.19e+05	7.45e+05	5.40e+08	6.09e+07	64	2.43e+05	2.41e+06	8.12e+08	1.40e+08
EI Exports to USA	55	8.99e+05	1.04e+07	5.94e+09	1.07e+09	9	3.29e+06	1.41e+07	2.28e+08	5.95e+07	64	9.31e+05	1.16e+07	5.35e+09	9.28e+08
CPR Exports to USA	55	5.07e+04	6.16e+05	1.37e+09	1.36e+08	9	5.16e+04	2.52e+05	1.85e+07	2.37e+06	64	5.11e+04	3.99e+05	5.32e+08	1.17e+08
TALF Exports to USA	55	4.93e+04	2.48e+06	2.96e+09	4.01e+08	9	3.90e+04	9.01e+04	2.28e+08	2.54e+07	64	4.91e+04	1.31e+06	1.94e+09	3.48e+08
ISOM Exports to USA	55	3.91e+04	5.77e+05	1.71e+09	1.92e+08	9	1.56e+04	3.36e+04	8.65e+07	1.01e+07	64	3.05e+04	4.61e+05	1.29e+09	1.67e+08
METE Exports to USA	55	1.32e+05	4.01e+05	5.47e+09	6.88e+08	9	1.78e+05	2.71e+05	1.32e+06	4.79e+05	64	1.37e+05	3.74e+05	2.23e+09	5.91e+08
OI Exports to USA	55	2.01e+05	1.81e+06	6.49e+08	7.68e+07	9	1.01e+05	9.83e+05	3.89e+06	1.31e+06	64	1.76e+05	1.35e+06	5.86e+08	6.62e+07
USA/EU	55	0.0870	0.2599	3.9483	0.8888	9	0.0477	0.1977	0.4873	0.1772	64	0.0804	0.2278	3.5025	0.7887
USA/EU, AMDS	55	0.0316	0.0890	1.1498	0.2560	9	0.0149	0.0303	0.3099	0.0652	64	0.0221	0.0719	0.9048	0.2292
USA/EU, FBTWP	55	0.0270	0.0888	1.7503	0.5124	9	0.0372	0.0612	0.2875	0.1304	64	0.0296	0.0887	1.3840	0.4587
USA/EU, EI	55	0.1152	0.5279	16.1640	2.4645	9	0.1840	0.3649	17.2291	2.6811	64	0.1520	0.4287	16.1640	2.4950
USA/EU, TALF	55	0.0664	0.2297	4.8298	0.6598	9	0.0173	0.0634	0.1706	0.0584	64	0.0548	0.1413	2.7226	0.5753
USA/EU, TALF	55	0.0478	0.2044	27.8011	5.3295	9	0.0141	0.0276	0.8346	0.1263	64	0.0288	0.1614	9.5500	4.5978
USA/EU, ISOM	55	0.0144	0.0791	0.9178	0.3230	9	0.0169	0.0227	0.2373	0.0644	64	0.0156	0.0743	0.8740	0.2866
USA/EU, METE	55	0.0324	0.0896	1.1408	0.2514	9	0.0620	0.0828	0.2101	0.0979	64	0.0341	0.0833	0.9602	0.2298
USA/EU, OI	55	0.1918	0.4853	2.2687	0.7592	9	0.1672	0.8600	5.9917	1.2913	64	0.1851	0.4876	2.2687	0.8340
USA/ROW	55	0.0365	0.1799	2.4408	0.7100	9	0.0298	0.1425	1.3290	0.3409	64	0.0356	0.1673	1.3851	0.6581

AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries.

Table D.11: Summary Statistics–All countries

	count	p25	p50	p95	mean
Exports to USA	115	8.86e+06	1.51e+08	1.33e+10	2.27e+09
USA/ROW	115	0.0661	0.2208	3.6207	0.7369
USA/EU, AMDS	115	0.0520	0.2081	3.7236	1.6190
USA/EU, FBTWP	115	0.0516	0.1911	3.0447	0.7258
USA/EU, EI	115	0.2004	0.6450	63.3549	10.2491
USA/EU, TALF	115	0.0714	0.3116	6.8481	1.4037
USA/EU, TALF	115	0.0696	0.3591	57.0529	7.8856
USA/EU, ISOM	115	0.0412	0.3234	6.2287	1.8384
USA/EU, METE	115	0.0395	0.1390	5.4197	0.9686
USA/EU, OI	115	0.1973	0.5995	5.9917	1.6319
USA/EU	115	0.0959	0.4689	6.6094	1.3702
AMDS Exports to USA	115	2.70e+05	2.84e+06	1.07e+09	1.18e+08
FBTWP Exports to USA	115	1.95e+05	1.61e+06	6.71e+08	1.12e+08
EI Exports to USA	115	4.69e+05	1.29e+07	5.94e+09	1.05e+09
CPR Exports to USA	115	8.18e+04	9.40e+05	6.02e+08	1.15e+08
TALF Exports to USA	115	5.61e+04	1.42e+06	1.94e+09	3.30e+08
ISOM Exports to USA	115	4.80e+04	5.77e+05	7.98e+08	1.13e+08
METE Exports to USA	115	2.04e+05	8.00e+05	1.51e+09	3.76e+08
OI Exports to USA	115	1.44e+05	1.15e+06	5.86e+08	6.07e+07

AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries.

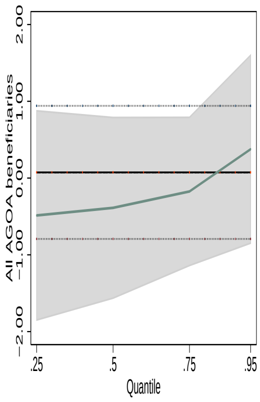
Table D.12: Summary Statistics - Other variables

	count	mean	min	max
Area	1570	4.08e+05	10	8.51e+06
Real GDP	1278	5757.740	145.0	42188.809
Weighted distance	1570	9845.144	2387.8	16764.666
Landlocked	1580	0.139	0	1.000
Voice & Accountability	1370	42.241	0	97.000
Political Stability	1290	41.012	1.500	96.000
Government Effectiveness	1330	42.466	1.500	98.000
Regulatory Quality	1340	42.306	0	100.000
Rule of Law	1340	40.646	0	92.000
Corruption	1330	43.342	0	96.500
Adj. Saving per GNI	975	8.765	-167.5	89.299
GDP per capita	1256	3026.931	62.95	27169.707
AGOA Treatment	1650	0.212	0	1.000
Preference Type	490	1.286	1	2.000
Regions (acc. to World Bank)	1400	3.064	1	5.000
High Income (NonOECD) (HI)	1400	0.157	0	1.000
Low Income (LI)	1400	0.236	0	1.000
Lower Middle Income (LMI)	1400	0.343	0	1.000
Upper Middle Income (UMI)	1400	0.264	0	1.000
Majority Christian	1282	0.495	0	1.000
Majority Muslim	1282	0.303	0	1.000
Other Religion	1282	0.203	0	1.000
Observations	1650			

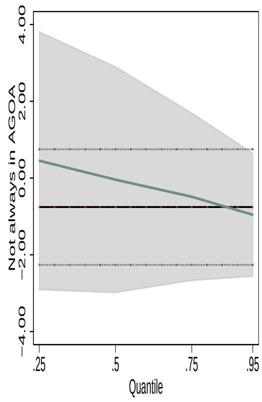
Preferential imports and shares (GSP, Non-GSP and No programme imports) data is for the period 2001–2010. Mirror export data on the other hand, is for the period 2001–2011. Data for controls based on data from 1985-1999 in most cases Data from WGI are based on averages for 1996 & 1998

Structural quantile regression estimates (cross-section)

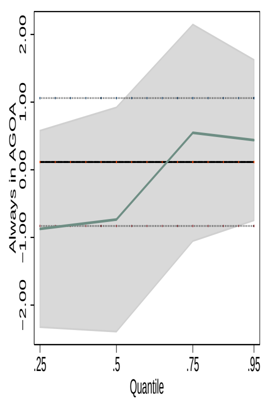
Full set of charts for tables 5.1, 5.2 & 5.6



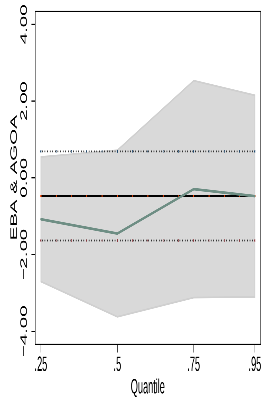
(a) All AGOA: USA



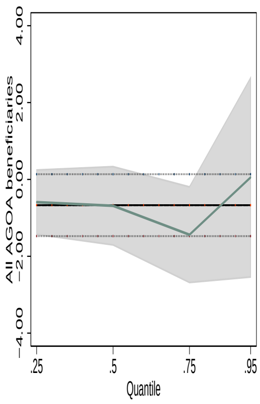
(b) In & Out: USA



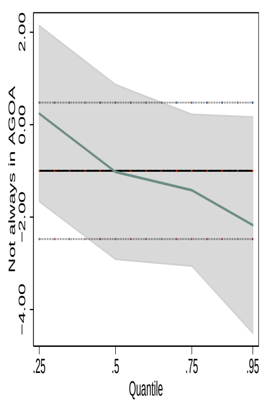
(c) Always AGOA: USA



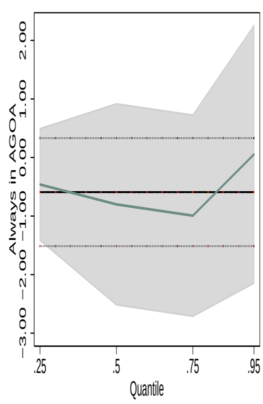
(d) EBA & AGOA: USA



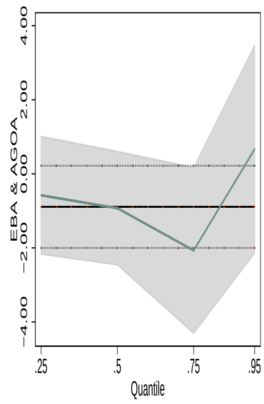
(e) All AGOA: USA/EU



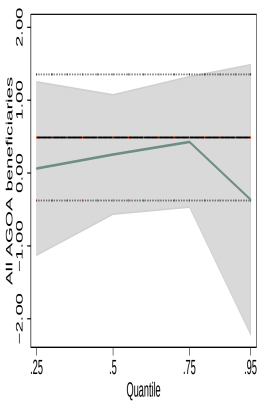
(f) In & Out: USA/EU



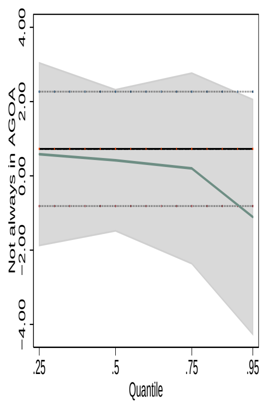
(g) Always: USA/EU



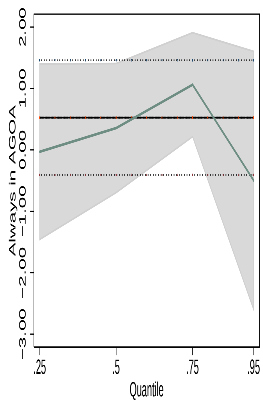
(h) EBA & AGOA: USA/EU



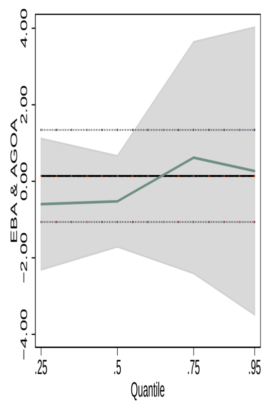
(i) All AGOA: USA/ROW



(j) In & Out: USA/ROW

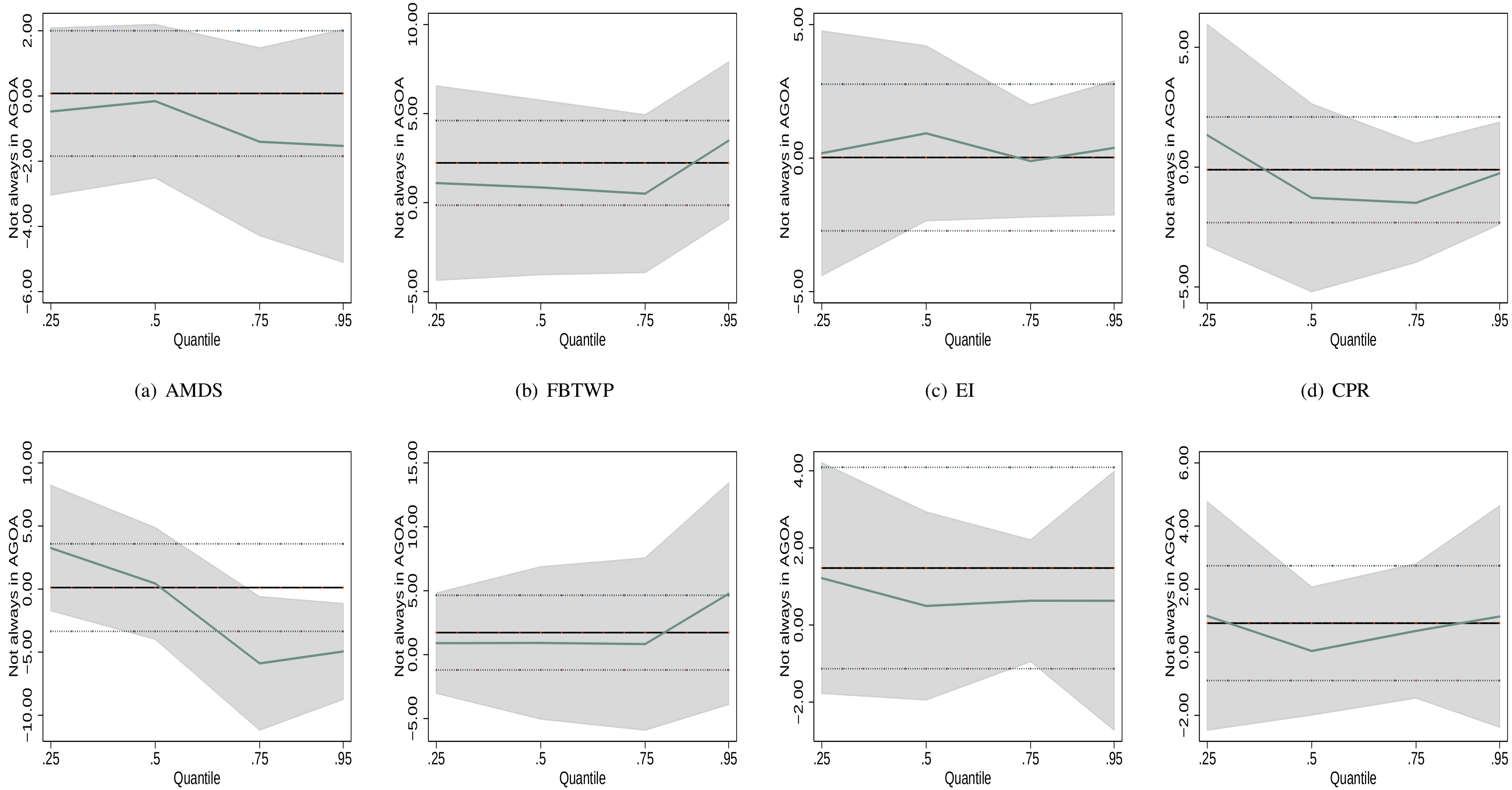


(k) Always AGOA: USA/ROW



(l) EBA & AGOA: USA/ROW

Figure D.1: *Estimated quantiles with confidence intervals: (cross-section) based on Table 5.1*

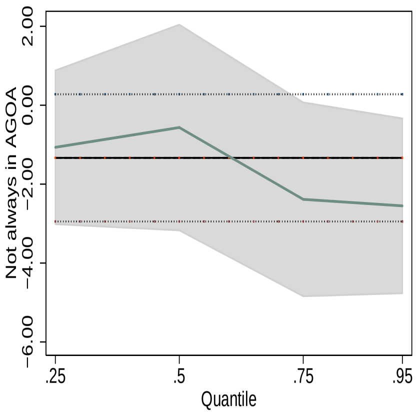


(a) AMDS (b) FBTWP (c) EI (d) CPR

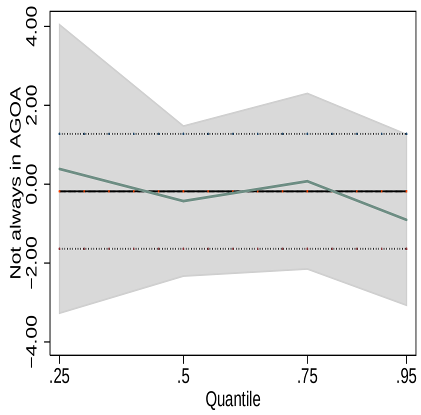
(e) TALF (f) ISOM (g) METE (h) OI

Controls include: English, Spanish & landlocked dummies, logs of distance, area & gdp and Mundlak terms & year dummies. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

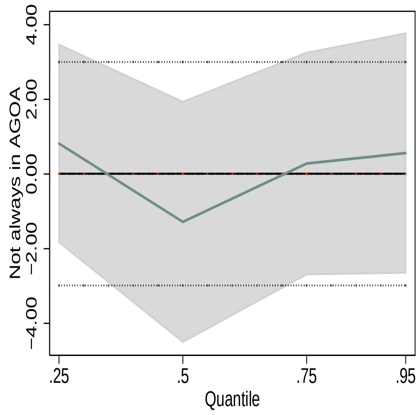
Figure D.2: *Estimated quantiles with confidence intervals: (cross-section) based on countries In & Out of AGOA, Table 5.2*



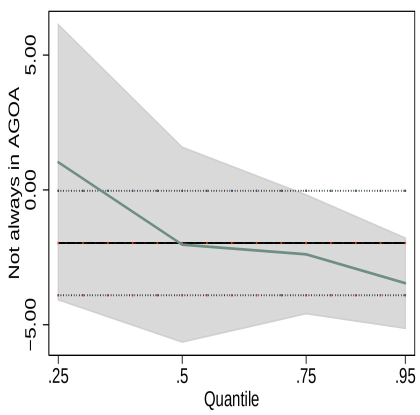
(a) AMDS



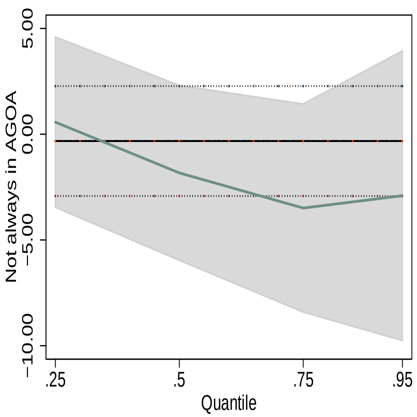
(b) FBTWP



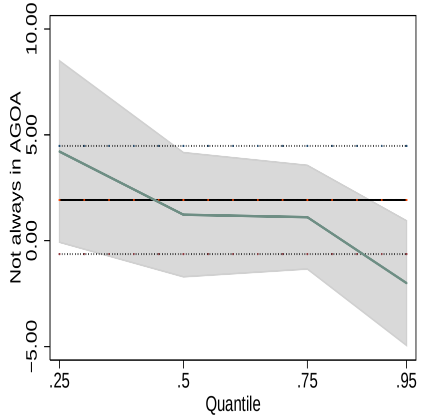
(c) EI



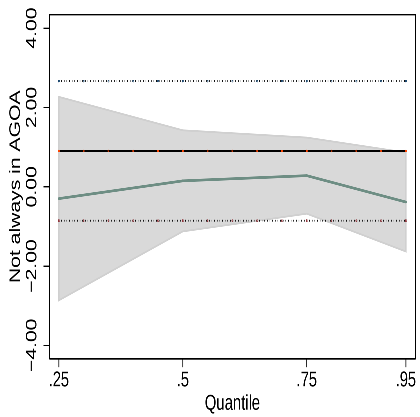
(d) CPR



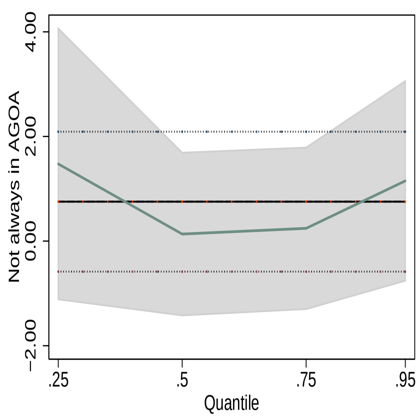
(e) TALF



(f) ISOM



(g) METE



(h) OI

Controls include: English, Spanish & landlocked dummies, logs of distance, area & gdp and Mundlak terms & year dummies. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Figure D.3: *Estimated quantiles with confidence intervals: (cross-section) based on countries In & Out of AGOA (USA/EU), Table 5.6*

Table D.13: Quantile regression estimates for exports to the USA: All countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	All	IN & OUT	Always	EBA & AGOA	All	IN & OUT	Always	EBA & AGOA	All	IN & OUT	Always	EBA & AGOA
q25												
All AGOA	0.807				-0.559				-0.462			
	(0.840)				(0.425)				(0.588)			
In & Out AGOA		-0.0331				-0.675				-0.601		
		(1.122)				(0.690)				(0.717)		
Always in AGOA			1.080				-0.543				-0.131	
			(0.887)				(0.377)				(0.679)	
EBA & AGOA				-0.497				-0.840				-0.821
				(1.147)				(0.474)				(0.644)
Constant	14.75***	15.30***	15.08***	15.32***	-2.048***	-2.368***	-2.056***	-2.056***	-2.912***	-2.914***	-2.914***	-2.859***
	(0.537)	(0.422)	(0.399)	(0.349)	(0.349)	(0.183)	(0.286)	(0.251)	(0.243)	(0.244)	(0.250)	(0.261)
q50												
All AGOA	-1.148				-1.382***				-0.158			
	(0.894)				(0.321)				(0.357)			
In & Out AGOA		-1.747				-0.931				-0.526		
		(1.300)				(0.659)				(0.781)		
Always in AGOA			-0.250				-1.357***				0.0762	
			(0.882)				(0.389)				(0.425)	
EBA & AGOA				-1.608*				-1.764***				-0.672
				(0.756)				(0.483)				(0.677)
Constant	18.64***	18.54***	18.41***	18.66***	-0.396*	-0.690**	-0.635**	-0.679**	-1.707***	-1.707***	-1.792***	-1.705***
	(0.641)	(0.444)	(0.564)	(0.369)	(0.163)	(0.259)	(0.196)	(0.227)	(0.208)	(0.171)	(0.198)	(0.178)
q75												
All AGOA	-1.896**				-1.507**				-0.280			
	(0.726)				(0.510)				(0.381)			
In & Out AGOA		-1.949				-1.591***				-0.270		
		(1.174)				(0.433)				(0.800)		
Always in AGOA			-1.487				-1.430				0.0603	
			(1.005)				(0.883)				(0.440)	
EBA & AGOA				-3.178*				-1.552				-0.552
				(1.280)				(1.095)				(0.996)
Constant	21.36***	21.25***	20.99***	21.25***	0.335*	0.308	0.279	0.279	-0.667***	-0.676***	-0.737***	-0.700***
	(0.497)	(0.514)	(0.503)	(0.482)	(0.162)	(0.159)	(0.142)	(0.149)	(0.153)	(0.160)	(0.157)	(0.166)
q95												
All AGOA	-0.817				-0.812				-0.567			
	(0.988)				(0.633)				(1.093)			
In & Out AGOA		-2.829***				-2.492***				-0.608		
		(0.722)				(0.352)				(0.710)		
Always in AGOA			-0.375				-0.601				0.968	
			(0.980)				(0.734)				(1.153)	
EBA & AGOA				-0.375				0.599				1.978
				(1.624)				(1.001)				(1.404)
Constant	23.43***	23.31***	23.31***	23.31***	2.066***	1.974***	1.974***	1.896***	0.892**	0.892*	0.841**	0.805**
	(0.350)	(0.332)	(0.346)	(0.336)	(0.242)	(0.228)	(0.255)	(0.209)	(0.319)	(0.365)	(0.298)	(0.289)
Observations	157	157	157	157	157	157	157	157	157	157	157	157

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is total exports to the USA, USA/EU and USA/ROW. Quantiles selected are .25, .50 & .75. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. First four columns are for exports to the USA, second four columns are for USA/EU and last four columns are USA/ROW export ratios * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table D.14: Quantile regression estimates for exports to the USA: All countries

	(1) All	(2) IN & OUT	(3) Always	(4) EBA & AGOA	(5) All	(6) IN & OUT	(7) Always	(8) EBA & AGOA	(9) All	(10) IN & OUT	(11) Always	(12) EBA & AGOA
q25												
All AGOA	-0.364				-0.269				0.00128			
	(0.567)				(0.413)				(0.605)			
In & Out AGOA		1.096				-0.285				0.0952		
		(1.330)				(0.628)				(0.818)		
Always in AGOA			-0.402				-0.203				0.775	
			(0.581)				(0.413)				(0.728)	
EBA & AGOA				-1.116*				-0.148				-0.546
				(0.481)				(0.475)				(0.824)
Constant	-8.734	-11.66	-9.394	-11.01*	-6.033	-5.315	-5.801	-5.660	2.658	2.654	2.953	1.321
	(6.195)	(5.988)	(6.262)	(5.454)	(5.553)	(5.854)	(6.507)	(6.091)	(5.404)	(5.750)	(5.219)	(4.997)
q50												
All AGOA	-0.389				-0.865				0.547			
	(0.498)				(0.543)				(0.422)			
In & Out AGOA		-0.0868				-0.926				-0.0401		
		(0.830)				(0.633)				(0.859)		
Always in AGOA			-0.485				-0.580				0.396	
			(0.612)				(0.548)				(0.485)	
EBA & AGOA				-1.407*				-0.837				-0.435
				(0.605)				(0.531)				(0.800)
Constant	-4.358	-7.337	-5.804	-4.705	0.122	1.038	-1.216	-0.0252	5.635	3.840	5.538	3.809
	(5.029)	(5.474)	(5.319)	(4.921)	(4.342)	(4.093)	(4.706)	(3.912)	(3.904)	(3.865)	(3.837)	(3.544)
q75												
All AGOA	-0.299				-1.229				0.805			
	(0.621)				(0.654)				(0.430)			
In & Out AGOA		-0.456				-1.476*				-0.350		
		(0.741)				(0.577)				(0.997)		
Always in AGOA			0.564				0.0764				0.816*	
			(0.935)				(0.843)				(0.403)	
EBA & AGOA				-1.325				-1.303				0.450
				(1.418)				(1.213)				(0.995)
Constant	-1.088	-1.126	-1.083	-1.083	12.03*	10.22	8.367	12.15*	7.362	6.870	9.824	7.037
	(4.692)	(4.205)	(4.297)	(3.929)	(5.825)	(5.500)	(6.440)	(6.084)	(5.195)	(5.737)	(5.070)	(5.446)
q95												
All AGOA	0.615				0.0516				0.986			
	(0.565)				(0.587)				(0.740)			
In & Out AGOA		-1.560**				-2.833***				0.831		
		(0.529)				(0.587)				(1.156)		
Always in AGOA			0.589				0.157				0.863	
			(0.676)				(0.670)				(1.006)	
EBA & AGOA				2.246				1.875				3.689
				(1.462)				(1.533)				(2.011)
Constant	4.227	6.564	4.806	4.067	14.51*	17.30**	14.78*	14.33*	11.14	9.042	11.12	11.51*
	(5.798)	(6.362)	(6.332)	(6.078)	(6.774)	(6.317)	(7.328)	(7.233)	(6.325)	(4.986)	(6.524)	(5.225)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	128	128	128	128	128	128	128	128	128	128	128	128

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variable is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. First four columns are for exports to the USA, second four columns are for USA/EU and last four columns are USA/ROW export ratios * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Further robustness checks: excluding selected products and top AGOA countries, comparison to CBTPA beneficiaries

Table D.15: Quantile regression: Excluding key products

	(1) Exports	(2) Exports	(3) Exports	(4) Exports	(5) Exports	(6) Exports	(7) Exports	(8) Exports
q25								
All AGOA	-0.470				-1.893**			
	(0.754)				(0.581)			
In & Out AGOA		0.219				-1.707		
		(1.889)				(2.156)		
Always in AGOA			-0.903				-1.987*	
			(0.647)				(0.816)	
EBA & AGOA				-0.797				-2.151**
				(0.640)				(0.789)
Constant	-43.08*	-65.73	-31.80	-31.75	-41.01	-84.83**	-50.52*	-50.60
	(17.554)	(35.803)	(19.081)	(24.034)	(30.843)	(29.504)	(24.965)	(35.891)
q50								
All AGOA	-1.228				-1.562*			
	(0.677)				(0.659)			
In & Out AGOA		1.268				-1.414		
		(2.023)				(1.521)		
Always in AGOA			-1.389*				-1.653**	
			(0.655)				(0.553)	
EBA & AGOA				-1.200				-1.922*
				(0.628)				(0.816)
Constant	-27.93*	-42.91	-32.88*	-36.24**	-60.33**	-51.15***	-52.62*	-39.94
	(12.534)	(24.793)	(12.390)	(12.154)	(21.577)	(13.204)	(19.931)	(24.323)
q75								
All AGOA	-0.897				-1.606			
	(0.822)				(1.136)			
In & Out AGOA		-0.459				-3.160		
		(1.643)				(1.905)		
Always in AGOA			-0.951				-1.598	
			(0.854)				(1.048)	
EBA & AGOA				-0.425				-1.228
				(1.035)				(1.794)
Constant	-35.93*	-19.86	-36.28**	-43.63***	-47.65**	-41.83*	-47.50*	-46.52
	(14.194)	(18.713)	(11.949)	(11.976)	(16.069)	(20.285)	(19.660)	(34.285)
q95								
All AGOA	-0.251				-0.877			
	(0.744)				(0.903)			
In & Out AGOA		-0.786				-3.245		
		(0.906)				(1.682)		
Always in AGOA			-2.871*				-2.296*	
			(1.078)				(1.045)	
EBA & AGOA				-0.915				-0.862
				(1.479)				(1.734)
Constant	-39.20*	-31.16	-30.69	-60.45**	-40.46*	-36.13	-41.49	-75.18*
	(16.353)	(16.746)	(17.941)	(18.878)	(18.270)	(24.743)	(20.772)	(28.985)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	71	38	60	48	68	37	58	46

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports less extractive industry exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. First four columns are for No programme exports, second four are for GSP and last four are for NonGSP exports * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table D.16: Quantile regression estimates for exports to the USA (excluding top five AGOA exporters)

	(1) Exports	(2) Exports	(3) Exports	(4) Exports
q25				
All AGOA	-0.746			
	(0.686)			
In & Out AGOA		1.092		
		(1.372)		
Always in AGOA			-0.874	
			(0.679)	
EBA & AGOA				-1.623*
				(0.779)
Constant	-32.88*	-41.69**	-32.33*	-20.45
	(15.050)	(13.433)	(15.316)	(14.476)
q50				
All AGOA	-0.412			
	(0.615)			
In & Out AGOA		0.804		
		(1.200)		
Always in AGOA			-0.898	
			(0.701)	
EBA & AGOA				-1.647*
				(0.690)
Constant	-38.63**	-36.98***	-32.86***	-22.87*
	(12.244)	(10.435)	(8.792)	(9.879)
q75				
All AGOA	-0.259			
	(0.733)			
In & Out AGOA		-0.126		

		(1.010)		
Always in AGOA			-0.298	
			(0.866)	
EBA & AGOA				-2.406*
				(1.189)
Constant	-16.73	-18.99	-16.03	-17.52
	(16.566)	(12.490)	(11.464)	(9.543)
q95				
All AGOA	0.675			
	(0.960)			
In & Out AGOA		-1.421		
		(0.927)		
Always in AGOA			0.644	
			(1.310)	
EBA & AGOA				2.947
				(2.519)
Constant	-52.48**	0.910	-50.03**	-27.74
	(15.900)	(16.662)	(16.042)	(28.438)
Controls	Yes	Yes	Yes	Yes
Observations	70	63	66	65

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports excluding top five AGOA exporters. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. First four columns are for exports to the USA, second four columns are for USA/EU and last four columns are USA/ROW export ratios * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table D.17: Quantile regression estimates for excluding top five AGOA and key products

	(1) Exports	(2) Exports	(3) Exports	(4) Exports	(5) Exports	(6) Exports	(7) Exports	(8) Exports
q25								
All AGOA	-0.294				-1.247			
	(0.386)				(0.711)			
In & Out AGOA		0.302				-0.191		
		(1.643)				(1.046)		
Always in AGOA			-0.509				-1.327*	
			(0.451)				(0.650)	
EBA & AGOA				-0.563				-1.898*
				(0.905)				(0.712)
Constant	-37.64*	-36.44*	-37.13**	-32.99	-45.67	-65.11**	-53.39*	-53.55**
	(14.939)	(14.350)	(11.751)	(20.729)	(23.684)	(20.675)	(20.902)	(18.949)
q50								
All AGOA	-0.896				-1.410			
	(0.547)				(0.820)			
In & Out AGOA		1.984				-0.266		
		(1.472)				(1.447)		
Always in AGOA			-1.005*				-1.254	
			(0.445)				(0.896)	
EBA & AGOA				-1.144				-1.643
				(0.651)				(1.245)
Constant	-34.95**	-52.00***	-38.89***	-44.70***	-63.85***	-61.78***	-63.30***	-61.08**
	(11.492)	(13.121)	(9.064)	(12.639)	(14.511)	(12.257)	(15.270)	(20.461)
q75								
All AGOA	-0.794				-1.527			
	(0.945)				(1.412)			
In & Out AGOA		1.354				-0.670		
		(1.540)				(1.275)		
Always in AGOA			-1.150*				-0.847	
			(0.499)				(1.201)	
EBA & AGOA				-1.915				-0.544
				(1.064)				(1.738)
Constant	-36.11*	-33.89	-32.63**	-27.54	-48.18*	-65.37***	-59.43***	-55.89*
	(14.615)	(17.684)	(10.367)	(17.590)	(18.130)	(16.748)	(15.765)	(20.968)
q95								
All AGOA	-0.182				-0.718			
	(0.955)				(1.836)			
In & Out AGOA		0.105				-2.278		
		(1.614)				(1.319)		
Always in AGOA			-2.131				-0.862	
			(1.145)				(1.301)	
EBA & AGOA				1.368				0.362
				(1.926)				(2.713)
Constant	-42.21**	-48.29**	-36.44**	-46.41**	-41.06	-75.18**	-75.18**	-75.18*
	(14.192)	(17.066)	(13.089)	(16.563)	(26.985)	(25.486)	(25.937)	(29.452)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	67	60	63	62	64	58	61	60

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. First four columns are for exports to the USA, second four columns are for USA/EU and last four columns are USA/ROW export ratios * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Panel data based structural quantile regression estimates

Summary information

Table D.18: AGOA (All) Countries under common support

Angola	Cote d'Ivoire	Madagascar	Senegal
Benin	Djibouti	Malawi	Seychelles
Botswana	Ethiopia(excludes Eritrea)	Mali	Sierra Leone
Burkina Faso	Gabon	Mauritania	South Africa
Burundi	Gambia, The	Mauritius	Swaziland
Cameroon	Ghana	Mozambique	Tanzania
Cape Verde	Guinea	Namibia	Togo
Chad	Guinea Bissau	Niger	Uganda
Comoro Is.	Kenya	Nigeria	Zambia
Congo (DROC)	Lesotho	Rwanda	
Congo (ROC)	Liberia	Sao Tome & Principe	

Table D.19: AGOA (In & Out) Countries under common support

Cent. Af. Rep.	Guinea Bissau
Congo (DROC)	Madagascar
Cote d'Ivoire	Mali
Eritrea	Mauritania
Guinea	Niger

Table D.20: AGOA (also EBA) Countries under common support

COUNTRY		
Angola	Gambia, The	Senegal
Benin	Lesotho	Sierra Leone
Cape Verde	Malawi	Tanzania
Chad	Mozambique	Uganda
Djibouti	Rwanda	Zambia
Ethiopia(excludes Eritrea)	Sao Tome & Principe	

Table D.21: AGOA (Always) Countries under common support

Angola	Congo (ROC)	Kenya	Nigeria	South Africa
Benin	Djibouti	Lesotho	Rwanda	Swaziland
Botswana	Ethiopia(excludes Eritrea)	Malawi	Sao Tome Principe	Tanzania
Cameroon	Gabon	Mauritius	Senegal	Uganda
Cape Verde	Gambia, The	Mozambique	Seychelles	Zambia
Chad	Ghana	Namibia	Sierra Leone	

Table D.22: Non–AGOA Countries under common support

Afghanistan	Cent. Af. Rep.	Laos	P. N. Guinea	Sri Lanka
Algeria	Chile	Lebanon	Pakistan	Tunisia
Argentina	Eritrea	Libya	Palau	Uruguay
Bangladesh	India	Malaysia	Peru	Vietnam
Bhutan	Iran, Islamic Rep.	Maldives	Philippines	Yemen
Brazil	Jordan	Mongolia	Solomon Is.	Zimbabwe
Cambodia	Kiribati	Nepal	Somalia	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table D.23: Non–AGOA Countries outside common support

Belize	Ecuador	Guyana	Morocco	St. Vincent and the Grenadines
Bolivia	Egypt, Arab Rep.	Haiti	Nicaragua	Suriname
Colombia	El Salvador	Honduras	Panama	Syrian Arab Republic
Costa Rica	F St Micronesia	Indonesia	Paraguay	Tonga
Cuba	Fiji	Iraq	Samoa	Vanuatu
Dominica	Grenada	Jamaica	St. Kitts and Nevis	Venezuela
Dominican Republic	Guatemala	Marshall Is	St. Lucia	

Table D.24: Summary Statistics–All AGOA

	Non-agoa count	p25	p50	p95	mean	agoa count	p25	p50	p95	mean	Total count	p25	p50	p95	mean
Exports to USA	188	2.16e+08	2.36e+09	2.66e+10	6.01e+09	209	2.63e+07	1.25e+08	9.17e+09	1.64e+09	397	7.01e+07	2.69e+08	2.42e+10	3.71e+09
TALF Exports to USA	188	3.59e+07	5.34e+08	3.84e+09	1.11e+09	209	4.49e+04	5.94e+05	2.53e+08	3.41e+07	397	2.71e+05	1.32e+07	3.19e+09	5.44e+08
AMDS Exports to USA	188	1.43e+06	4.54e+07	1.71e+09	3.39e+08	209	3.24e+05	3.30e+06	1.06e+08	1.67e+07	397	6.82e+05	6.97e+06	1.06e+09	1.69e+08
FBTWP Exports to USA	188	5.54e+06	2.53e+07	1.95e+09	4.24e+08	209	2.74e+05	2.37e+06	2.02e+08	4.24e+07	397	6.98e+05	8.41e+06	1.14e+09	2.23e+08
EI Exports to USA	188	6.25e+06	7.69e+07	6.42e+09	1.13e+09	209	5.10e+05	1.07e+07	5.27e+09	1.38e+09	397	3.06e+06	3.05e+07	6.32e+09	1.26e+09
CPR Exports to USA	188	3.83e+06	1.80e+07	1.89e+09	3.60e+08	209	4.86e+04	3.36e+05	1.43e+08	3.03e+07	397	1.48e+05	3.13e+06	1.28e+09	1.86e+08
ISOM Exports to USA	188	4.44e+05	4.33e+06	2.57e+09	4.82e+08	209	3.08e+04	3.69e+05	2.76e+08	7.31e+07	397	1.14e+05	9.78e+05	1.81e+09	2.67e+08
METE Exports to USA	188	7.47e+05	1.08e+07	1.75e+10	1.94e+09	209	9.38e+04	4.23e+05	9.77e+06	6.01e+07	397	2.03e+05	1.07e+06	6.12e+09	9.53e+08
OI Exports to USA	188	3.63e+06	1.69e+07	1.16e+09	2.19e+08	209	2.30e+05	1.05e+06	1.16e+07	5.04e+06	397	6.27e+05	3.06e+06	6.93e+08	1.06e+08
USA/EU	188	0.4051	0.6959	2.9146	0.9897	209	0.0853	0.1629	2.1745	0.6282	397	0.1329	0.3119	2.5278	0.7994
USA/EU, AMDS	188	0.0977	0.2299	1.9638	0.6070	209	0.0120	0.0400	0.4189	0.0835	397	0.0219	0.0834	1.4965	0.3314
USA/EU, FBTWP	188	0.1298	0.3619	1.4406	1.1071	209	0.0198	0.0488	0.4144	0.3299	397	0.0398	0.1209	1.3856	0.6979
USA/EU, EI	188	0.5072	1.4790	32.8716	7.7151	209	0.0992	0.2552	6.7449	63.0170	397	0.1566	0.5564	22.0922	36.8287
USA/EU, CPR	188	0.1168	0.5887	3.2961	0.9839	209	0.0191	0.0863	1.4442	6.9453	397	0.0328	0.1988	1.8462	4.1223
USA/EU, TALF	188	0.2806	0.7089	14.6879	4.1906	209	0.0110	0.0748	7.9007	1.8310	397	0.0308	0.2645	8.3284	2.9484
USA/EU, ISOM	188	0.0478	0.3494	1.4934	0.4819	209	0.0062	0.0476	1.6857	0.3480	397	0.0158	0.1320	1.6731	0.4114
USA/EU, METE	188	0.0699	0.2717	1.8217	0.5147	209	0.0182	0.0619	0.6099	0.1643	397	0.0267	0.1175	1.6077	0.3302
USA/EU, OI	188	0.4104	0.8457	4.4747	1.2888	209	0.1260	0.2885	5.5529	1.1855	397	0.1826	0.6040	4.8925	1.2344
USA/ROW	188	0.1434	0.2873	2.3467	0.5369	209	0.1086	0.2054	1.6249	0.4502	397	0.1229	0.2440	1.7878	0.4912

AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries.

Table D.25: Summary Statistics–EBA & AGOA at same time

	0 count	p25	p50	p95	mean	1 count	p25	p50	p95	mean	Total count	p25	p50	p95	mean
Exports to USA	339	1.19e+08	4.72e+08	2.54e+10	4.33e+09	58	9.85e+06	2.61e+07	1.18e+08	6.59e+07	397	7.01e+07	2.69e+08	2.42e+10	3.71e+09
TALF Exports to USA	339	6.00e+05	5.27e+07	3.36e+09	6.36e+08	58	6.23e+04	4.35e+05	7.49e+06	1.67e+06	397	2.71e+05	1.32e+07	3.19e+09	5.44e+08
AMDS Exports to USA	339	6.82e+05	6.71e+06	1.12e+09	1.95e+08	58	5.49e+05	1.06e+07	8.79e+07	1.82e+07	397	6.82e+05	6.97e+06	1.06e+09	1.69e+08
FBTWP Exports to USA	339	1.65e+06	1.39e+07	1.37e+09	2.61e+08	58	1.53e+05	3.95e+05	6.09e+06	1.74e+06	397	6.98e+05	8.41e+06	1.14e+09	2.23e+08
EI Exports to USA	339	4.62e+06	6.40e+07	7.73e+09	1.47e+09	58	3.42e+04	3.42e+05	1.17e+07	3.71e+07	397	3.06e+06	3.05e+07	6.32e+09	1.26e+09
CPR Exports to USA	339	4.16e+05	5.66e+06	1.43e+09	2.18e+08	58	5779.0000	4.47e+04	9.57e+05	1.49e+05	397	1.48e+05	3.13e+06	1.28e+09	1.86e+08
ISOM Exports to USA	339	1.49e+05	1.02e+06	2.02e+09	3.11e+08	58	3.34e+04	4.32e+05	4.38e+07	6.09e+06	397	1.14e+05	9.78e+05	1.81e+09	2.67e+08
METE Exports to USA	339	3.52e+05	2.35e+06	6.41e+09	1.12e+09	58	4.21e+04	1.29e+05	1.65e+06	3.41e+05	397	2.03e+05	1.07e+06	6.12e+09	9.53e+08
OI Exports to USA	339	1.59e+06	4.65e+06	7.40e+08	1.24e+08	58	6.70e+04	2.18e+05	2.12e+06	5.17e+05	397	6.27e+05	3.06e+06	6.93e+08	1.06e+08
USA/EU	339	0.1692	0.4458	2.7519	0.7970	58	0.0496	0.0872	0.2888	0.8134	397	0.1329	0.3119	2.5278	0.7994
USA/EU, AMDS	339	0.0194	0.0840	1.6088	0.3684	58	0.0310	0.0794	0.2677	0.1152	397	0.0219	0.0834	1.4965	0.3314
USA/EU, FBTWP	339	0.0519	0.1307	1.3404	0.6584	58	0.0041	0.0167	2.9597	0.9290	397	0.0398	0.1209	1.3856	0.6979
USA/EU, EI	339	0.2136	0.8051	22.9072	5.9064	58	0.0386	0.1307	1.3347	217.5641	397	0.1566	0.5564	22.0922	36.8287
USA/EU, CPR	339	0.0513	0.2493	1.8462	0.6821	58	0.0075	0.0305	2.0275	24.2294	397	0.0328	0.1988	1.8462	4.1223
USA/EU, TALF	339	0.0452	0.4349	12.0053	3.4319	58	0.0140	0.0694	0.4530	0.1222	397	0.0308	0.2645	8.3284	2.9484
USA/EU, ISOM	339	0.0164	0.1516	1.5688	0.4022	58	0.0118	0.0891	1.7002	0.4655	397	0.0158	0.1320	1.6731	0.4114
USA/EU, METE	339	0.0411	0.1547	1.6986	0.3775	58	0.0083	0.0272	0.2563	0.0538	397	0.0267	0.1175	1.6077	0.3302
USA/EU, OI	339	0.2516	0.6731	5.3346	1.3694	58	0.0736	0.1581	1.6553	0.4456	397	0.1826	0.6040	4.8925	1.2344
USA/ROW	339	0.1466	0.2827	2.1819	0.5335	58	0.0317	0.1054	1.0360	0.2444	397	0.1229	0.2440	1.7878	0.4912

AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries.

Table D.26: Summary Statistics–Always had AGOA

	0					1					Total				
	count	p25	p50	p95	mean	count	p25	p50	p95	mean	count	p25	p50	p95	mean
Exports to USA	250	9.70e+07	8.43e+08	2.54e+10	4.57e+09	147	2.93e+07	1.59e+08	1.09e+10	2.25e+09	397	7.01e+07	2.69e+08	2.42e+10	3.71e+09
TALF Exports to USA	250	3.79e+05	7.77e+07	3.58e+09	8.37e+08	147	1.94e+05	1.51e+06	2.59e+08	4.39e+07	397	2.71e+05	1.32e+07	3.19e+09	5.44e+08
AMDS Exports to USA	250	6.63e+05	7.30e+06	1.32e+09	2.56e+08	147	9.91e+05	6.84e+06	1.18e+08	2.16e+07	397	6.82e+05	6.97e+06	1.06e+09	1.69e+08
FBTWP Exports to USA	250	1.10e+06	1.38e+07	1.61e+09	3.39e+08	147	3.04e+05	5.81e+06	1.66e+08	2.63e+07	397	6.98e+05	8.41e+06	1.14e+09	2.23e+08
EI Exports to USA	250	4.50e+06	5.92e+07	5.58e+09	8.69e+08	147	5.29e+05	1.04e+07	1.09e+10	1.93e+09	397	3.06e+06	3.05e+07	6.32e+09	1.26e+09
CPR Exports to USA	250	3.02e+05	7.61e+06	1.65e+09	2.72e+08	147	4.48e+04	5.84e+05	3.86e+08	4.03e+07	397	1.48e+05	3.13e+06	1.28e+09	1.86e+08
ISOM Exports to USA	250	1.49e+05	1.37e+06	2.17e+09	3.66e+08	147	6.31e+04	5.90e+05	7.83e+08	9.78e+07	397	1.14e+05	9.78e+05	1.81e+09	2.67e+08
METE Exports to USA	250	3.61e+05	3.37e+06	7.18e+09	1.46e+09	147	1.01e+05	4.42e+05	7.13e+08	8.52e+07	397	2.03e+05	1.07e+06	6.12e+09	9.53e+08
OI Exports to USA	250	1.68e+06	7.88e+06	7.91e+08	1.65e+08	147	1.99e+05	1.22e+06	4.59e+07	6.45e+06	397	6.27e+05	3.06e+06	6.93e+08	1.06e+08
USA/EU	250	0.1826	0.5539	2.4413	0.7936	147	0.0867	0.1613	2.6305	0.8093	397	0.1329	0.3119	2.5278	0.7994
USA/EU, AMDS	250	0.0285	0.1411	1.8662	0.4680	147	0.0162	0.0487	0.4427	0.0992	397	0.0219	0.0834	1.4965	0.3314
USA/EU, FBTWP	250	0.0879	0.2594	1.4274	0.8687	147	0.0157	0.0472	0.2868	0.4075	397	0.0398	0.1209	1.3856	0.6979
USA/EU, EI	250	0.2897	1.0411	32.8716	7.4050	147	0.0700	0.2498	4.2429	86.8690	397	0.1566	0.5564	22.0922	36.8287
USA/EU, CPR	250	0.0374	0.3365	2.2718	0.7896	147	0.0282	0.1262	1.4162	9.7902	397	0.0328	0.1988	1.8462	4.1223
USA/EU, TALF	250	0.0574	0.5087	5.5052	3.1909	147	0.0221	0.1352	11.0303	2.5359	397	0.0308	0.2645	8.3284	2.9484
USA/EU, ISOM	250	0.0205	0.2028	1.4818	0.3924	147	0.0082	0.0750	1.7154	0.4437	397	0.0158	0.1320	1.6731	0.4114
USA/EU, METE	250	0.0450	0.1987	1.7491	0.4314	147	0.0154	0.0590	0.6099	0.1581	397	0.0267	0.1175	1.6077	0.3302
USA/EU, OI	250	0.3616	0.8307	6.1287	1.6241	147	0.1072	0.2215	2.4338	0.5716	397	0.1826	0.6040	4.8925	1.2344
USA/ROW	250	0.1230	0.2704	2.3957	0.5287	147	0.1226	0.2057	1.5062	0.4276	397	0.1229	0.2440	1.7878	0.4912

AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries.

Table D.27: Summary Statistics–In & Out of AGOA

	0					1					Total				
	count	p25	p50	p95	mean	count	p25	p50	p95	mean	count	p25	p50	p95	mean
Exports to USA	346	8.01e+07	3.19e+08	2.51e+10	4.22e+09	51	2.68e+07	1.12e+08	1.16e+09	2.36e+08	397	7.01e+07	2.69e+08	2.42e+10	3.71e+09
TALF Exports to USA	346	1.17e+06	4.08e+07	3.30e+09	6.22e+08	51	3.43e+04	9.82e+04	9.74e+07	1.34e+07	397	2.71e+05	1.32e+07	3.19e+09	5.44e+08
AMDS Exports to USA	346	9.76e+05	1.09e+07	1.08e+09	1.93e+08	51	1.51e+05	5.88e+05	3.41e+07	6.18e+06	397	6.82e+05	6.97e+06	1.06e+09	1.69e+08
FBTWP Exports to USA	346	9.14e+05	1.15e+07	1.35e+09	2.42e+08	51	3.15e+05	1.31e+06	6.87e+08	9.74e+07	397	6.98e+05	8.41e+06	1.14e+09	2.23e+08
EI Exports to USA	346	3.11e+06	3.20e+07	6.88e+09	1.43e+09	51	1.96e+06	2.43e+07	4.09e+08	9.47e+07	397	3.06e+06	3.05e+07	6.32e+09	1.26e+09
CPR Exports to USA	346	2.26e+05	4.44e+06	1.43e+09	2.13e+08	51	7.49e+04	2.49e+05	2.52e+07	3.72e+06	397	1.48e+05	3.13e+06	1.28e+09	1.86e+08
ISOM Exports to USA	346	1.59e+05	1.12e+06	1.95e+09	3.04e+08	51	1.59e+04	9.62e+04	9.79e+07	1.77e+07	397	1.14e+05	9.78e+05	1.81e+09	2.67e+08
METE Exports to USA	346	2.22e+05	1.92e+06	6.33e+09	1.09e+09	51	1.55e+05	4.23e+05	3.06e+06	6.96e+05	397	2.03e+05	1.07e+06	6.12e+09	9.53e+08
OI Exports to USA	346	8.97e+05	4.15e+06	7.24e+08	1.22e+08	51	4.24e+05	1.03e+06	6.38e+06	2.00e+06	397	6.27e+05	3.06e+06	6.93e+08	1.06e+08
USA/EU	346	0.1327	0.3793	2.7519	0.8826	51	0.1431	0.1788	0.7048	0.2349	397	0.1329	0.3119	2.5278	0.7994
USA/EU, AMDS	346	0.0320	0.1026	1.5483	0.3713	51	0.0120	0.0218	0.1980	0.0610	397	0.0219	0.0834	1.4965	0.3314
USA/EU, FBTWP	346	0.0424	0.1249	1.3993	0.7751	51	0.0356	0.0807	0.7277	0.1747	397	0.0398	0.1209	1.3856	0.6979
USA/EU, EI	346	0.1566	0.6923	19.7677	41.1446	51	0.1477	0.3453	33.4197	7.5482	397	0.1566	0.5564	22.0922	36.8287
USA/EU, CPR	346	0.0568	0.2941	2.0275	4.7200	51	0.0044	0.0285	0.2093	0.0673	397	0.0328	0.1988	1.8462	4.1223
USA/EU, TALF	346	0.0605	0.4050	11.0303	3.3550	51	0.0091	0.0289	1.1735	0.1901	397	0.0308	0.2645	8.3284	2.9484
USA/EU, ISOM	346	0.0180	0.1821	1.7002	0.4585	51	0.0062	0.0309	0.2891	0.0918	397	0.0158	0.1320	1.6731	0.4114
USA/EU, METE	346	0.0256	0.1165	1.6077	0.3496	51	0.0427	0.1241	0.5607	0.1988	397	0.0267	0.1175	1.6077	0.3302
USA/EU, OI	346	0.1682	0.5320	3.6345	0.9725	51	0.3824	0.8661	13.3921	3.0111	397	0.1826	0.6040	4.8925	1.2344
USA/ROW	346	0.1229	0.2364	1.6249	0.4754	51	0.1151	0.2455	2.5326	0.5987	397	0.1229	0.2440	1.7878	0.4912

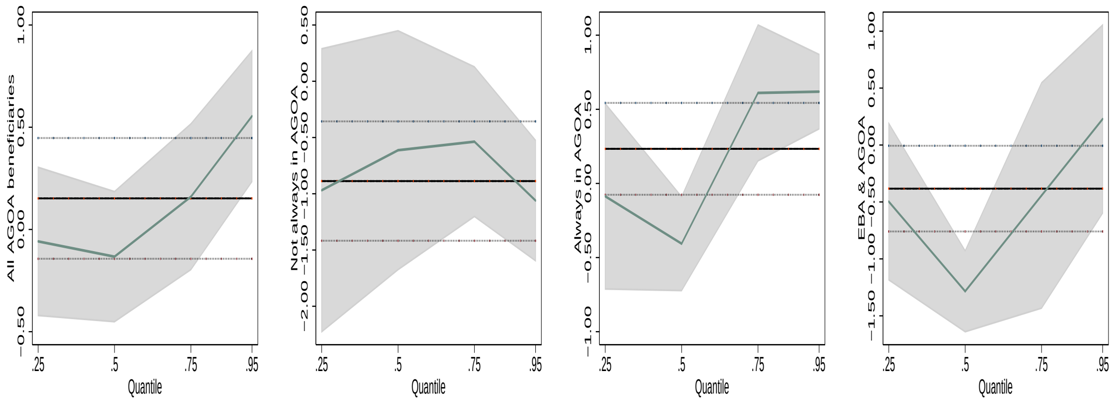
AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries.

Table D.28: Summary Statistics–All countries

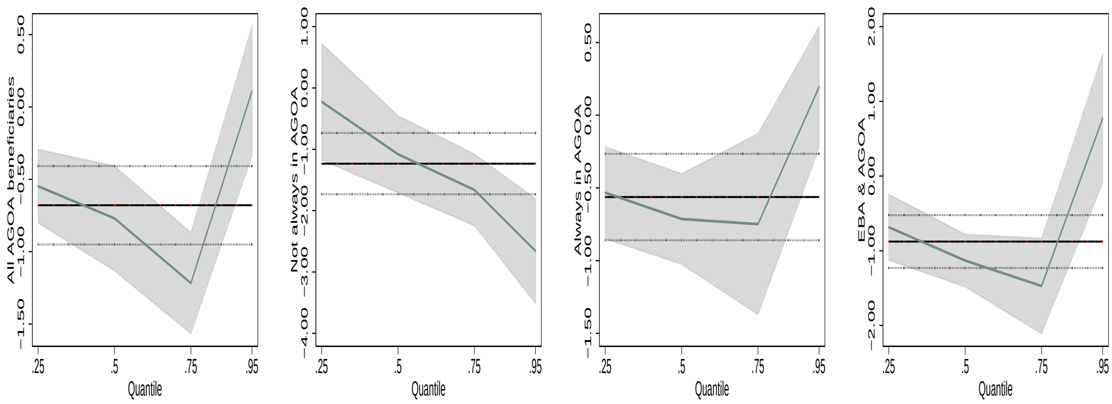
	count	p25	p50	p95	mean
Exports to USA	631	9.27e+07	3.42e+08	2.21e+10	3.63e+09
USA/ROW	631	0.1335	0.3032	3.2379	0.8872
USA/EU, AMDS	631	0.0365	0.1743	2.6040	0.8599
USA/EU, FBTWP	631	0.0664	0.2513	4.1283	1.2157
USA/EU, EI	631	0.2038	1.0374	308.6175	91.1470
USA/EU, CPR	631	0.0643	0.4035	8.3000	4.0408
USA/EU, TALF	631	0.0688	0.5234	95.0349	14.5985
USA/EU, ISOM	631	0.0312	0.2819	14.8643	4.8194
USA/EU, METE	631	0.0380	0.2099	7.9344	2.4683
USA/EU, OI	631	0.2141	0.7326	10.6230	3.1005
USA/EU	631	0.1600	0.5489	8.4121	1.7049
TALF Exports to USA	631	6.25e+05	2.06e+07	2.84e+09	5.71e+08
AMDS Exports to USA	631	1.25e+06	1.99e+07	1.22e+09	2.12e+08
FBTWP Exports to USA	631	1.15e+06	1.82e+07	1.13e+09	2.00e+08
EI Exports to USA	631	2.61e+06	4.61e+07	7.69e+09	1.49e+09
CPR Exports to USA	631	2.76e+05	5.15e+06	1.05e+09	1.71e+08
ISOM Exports to USA	631	1.43e+05	2.90e+06	1.34e+09	1.99e+08
METE Exports to USA	631	3.44e+05	2.81e+06	3.61e+09	6.80e+08
OI Exports to USA	631	5.69e+05	4.08e+06	7.24e+08	1.10e+08

AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries.

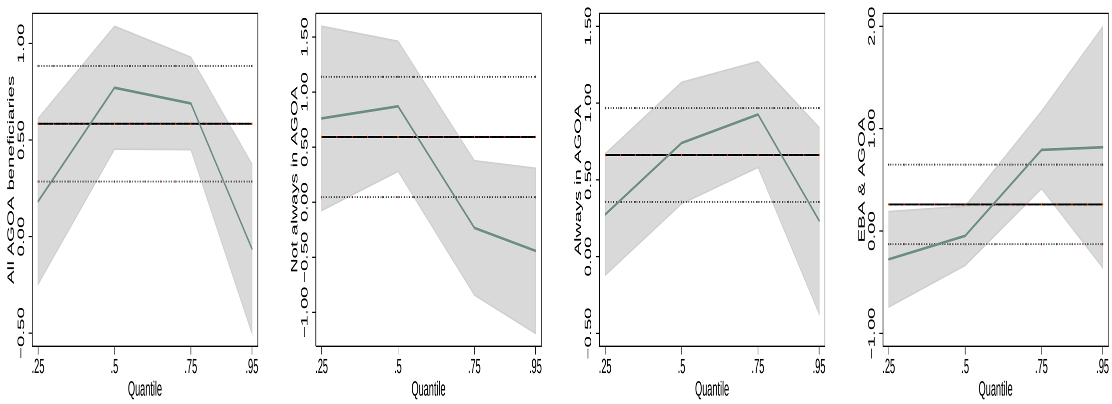
Full set of charts for tables 5.10, 5.11 & 5.15



(a) All AGOA: USA (b) In & Out: USA (c) Always AGOA: USA (d) EBA & AGOA: USA

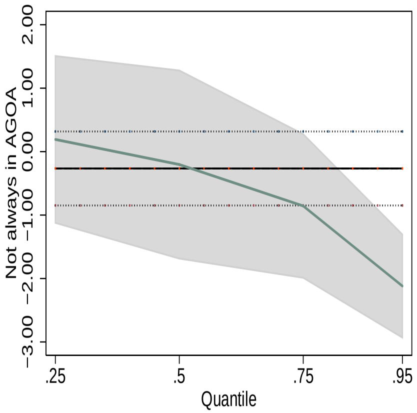


(e) All AGOA: USA/EU (f) In & Out: USA/EU (g) Always: USA/EU (h) EBA & AGOA: USA/EU

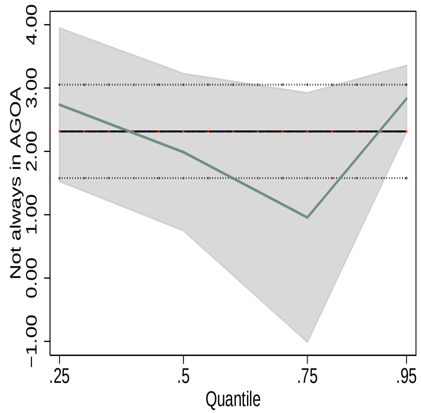


(i) All AGOA: USA/ROW (j) In & Out: USA/ROW (k) Always AGOA: USA/ROW (l) EBA & AGOA: USA/ROW

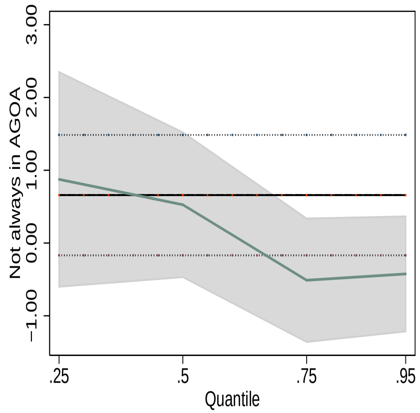
Figure D.4: *Estimated quantiles with confidence intervals: (Panel) based on Table 5.10*



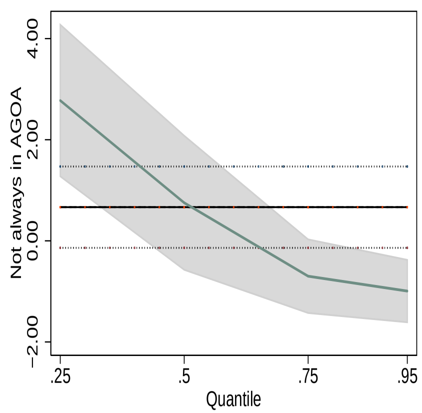
(a) AMDS



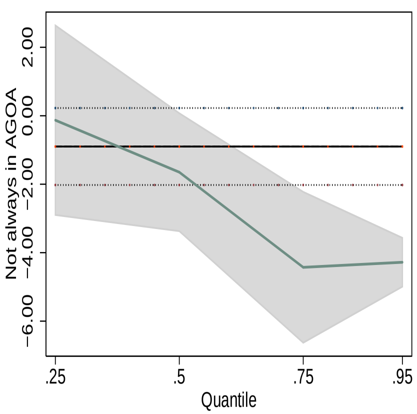
(b) FBTWP



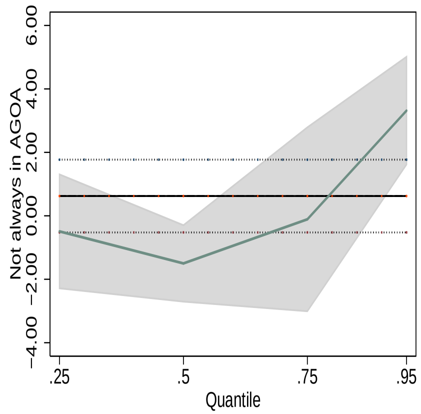
(c) EI



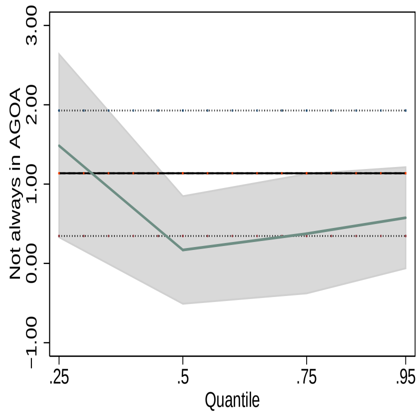
(d) CPR



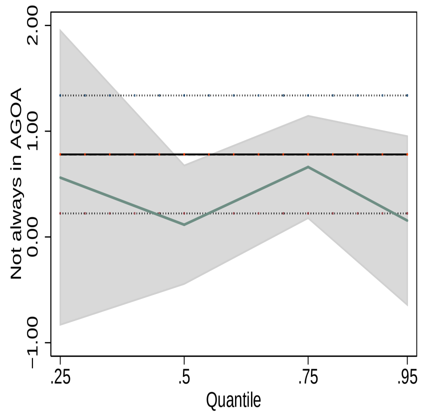
(e) TALF



(f) ISOM



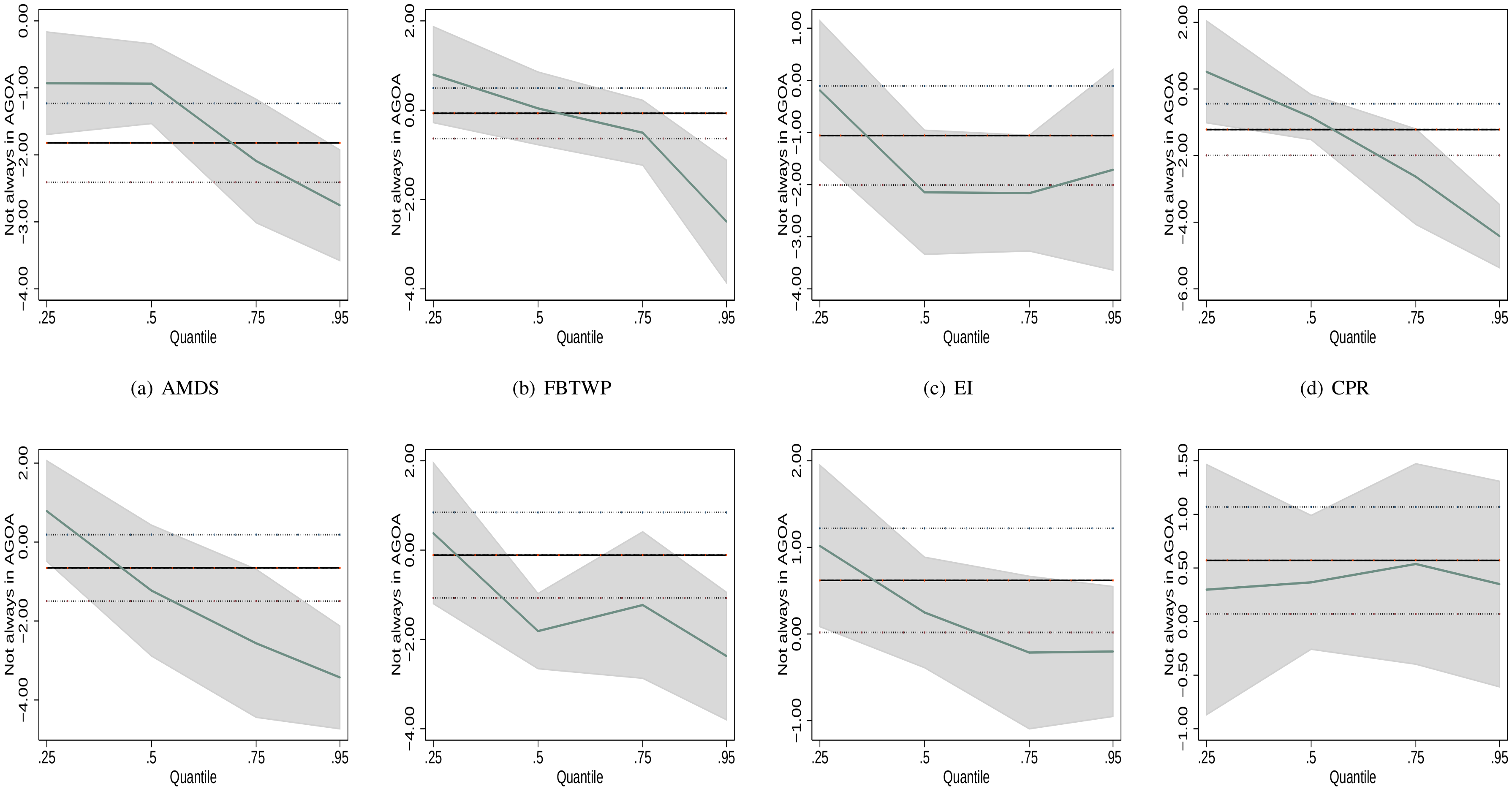
(g) METE



(h) OI

Controls include: English, Spanish & landlocked dummies, logs of distance, area & gdp and Mundlak terms & year dummies. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Figure D.5: *Estimated quantiles with confidence intervals: (Panel) based on countries In & Out of AGOA, Table 5.11*



(a) AMDS (b) FBTWP (c) EI (d) CPR

(e) TALF (f) ISOM (g) METE (h) OI

Controls include: English, Spanish & landlocked dummies, logs of distance, area & gdp and Mundlak terms & year dummies. AMDS–Agriculture, meat and dairy, & seafood (HS 1–10, 12–14); FBTWP–Food, beverages, tobacco, wood, & paper(HS 11, 15–24, 44–48); EI–Extractive industries (HS 25–27, 68–71); CPR–Chemicals, plastics, & rubber (HS 28–36, 38–40); TALF–Textiles, apparel, leather, & footwear (HS41–42, 50–65); ISOM–Iron, steel, and other metals (HS 26, 72–83); METE–Machinery, electronics, & transportation equipment (HS 84–89); & OI–Other industries (HS 37, 43, 49, 66–67, 90–97).

Figure D.6: *Estimated quantiles with confidence intervals: (Panel) based on countries In & Out of AGOA (USA/EU), Table 5.15*

Table D.29: Quantile regression estimates for exports to the USA: All countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Total exports to USA				USA/EU export ratio				USA/ROW export ratio		
	All	IN & OUT	Always	EBA & AGOA	All	IN & OUT	Always	EBA & AGOA	All	IN & OUT	Always	EBA & AGOA
q25												
All AGOA	-1.082***				-1.024***				-0.500*			
	(0.166)				(0.142)				(0.226)			
In & Out AGOA		-1.988***				-0.787*				-0.709		
		(0.327)				(0.306)				(0.395)		
Always in AGOA			-0.762***				-0.660***				-0.0875	
			(0.157)				(0.129)				(0.209)	
EBA & AGOA				-1.371***				-0.870***				-1.012***
				(0.148)				(0.165)				(0.186)
Constant	-11.64***	-13.23***	-12.11***	-12.15***	-8.353***	-9.920***	-9.659***	-8.890***	-10.14***	-10.14***	-10.69***	-9.611***
	(0.786)	(0.730)	(0.758)	(0.770)	(0.667)	(0.738)	(0.524)	(0.615)	(0.838)	(0.841)	(0.831)	(0.703)
q50												
All AGOA	-0.892***				-1.534***				-0.192			
	(0.141)				(0.127)				(0.147)			
In & Out AGOA		-0.802				-0.980***				-0.296		
		(0.561)				(0.181)				(0.243)		
Always in AGOA			-0.832***				-1.058***				-0.108	
			(0.142)				(0.130)				(0.147)	
EBA & AGOA				-1.996***				-1.292***				-0.806***
				(0.150)				(0.194)				(0.236)
Constant	-9.889***	-9.526***	-10.08***	-8.223***	-2.372**	-5.715***	-5.002***	-4.469***	-4.815***	-5.057***	-5.748***	-4.494***
	(0.736)	(0.920)	(0.833)	(0.684)	(0.843)	(0.988)	(0.825)	(0.977)	(0.886)	(0.773)	(0.827)	(0.833)
q75												
All AGOA	-0.860***				-1.791***				-0.412**			
	(0.165)				(0.156)				(0.145)			
In & Out AGOA		-0.915***				-1.972***				-0.596*		
		(0.147)				(0.176)				(0.293)		
Always in AGOA			-0.591*				-1.295***				-0.329*	
			(0.261)				(0.314)				(0.153)	
EBA & AGOA				-2.328***				-1.677***				-0.581*
				(0.571)				(0.232)				(0.248)
Constant	-5.685***	-6.177***	-6.154***	-5.739***	1.590	0.681	0.720	0.737	-4.742***	-4.656***	-5.331***	-4.584***
	(0.961)	(1.058)	(1.095)	(1.083)	(0.995)	(0.994)	(1.122)	(1.017)	(0.942)	(0.826)	(0.956)	(0.902)
q95												
All AGOA	0.430**				-0.955***				-0.402			
	(0.140)				(0.187)				(0.326)			
In & Out AGOA		-1.328***				-2.830***				-0.657**		
		(0.181)				(0.232)				(0.232)		
Always in AGOA			0.586***				-0.670**				0.280	
			(0.113)				(0.224)				(0.560)	
EBA & AGOA				0.547***				-0.134				1.342**
				(0.157)				(0.525)				(0.427)
Constant	-3.525***	-2.843**	-2.872***	-3.186***	6.984***	6.884***	6.345***	6.781***	3.700**	3.817*	3.435**	2.978*
	(0.753)	(0.950)	(0.518)	(0.604)	(1.434)	(1.665)	(1.455)	(1.700)	(1.426)	(1.737)	(1.314)	(1.396)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1086	1086	1086	1086	1086	1086	1086	1086	1086	1086	1086	1086

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. First four columns are for exports to the USA, second four columns are for USA/EU and last four columns are USA/ROW export ratios * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table D.30: Quantile regression estimates for exports to the USA: All countries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Total exports to USA				USA/EU export ratio				USA/ROW export ratio		
	All	IN & OUT	Always	EBA & AGOA	All	IN & OUT	Always	EBA & AGOA	All	IN & OUT	Always	EBA & AGOA
q25												
All AGOA	-0.455**				-0.682***				0.117			
	(0.171)				(0.150)				(0.157)			
In & Out AGOA		-1.124*				-0.144				0.265		
		(0.439)				(0.347)				(0.421)		
Always in AGOA			-0.328*				-0.642***				0.255	
			(0.167)				(0.151)				(0.186)	
EBA & AGOA				-1.157***				-0.807***				-0.411
				(0.226)				(0.186)				(0.235)
Constant	-13.58***	-9.809***	-13.66***	-11.43***	-6.031*	-4.930*	-8.364***	-4.488	-4.424*	-5.182*	-4.293	-5.259*
	(3.244)	(2.715)	(2.976)	(3.078)	(2.765)	(2.447)	(2.522)	(2.429)	(2.254)	(2.054)	(2.314)	(2.223)
q50												
All AGOA	-0.346*				-1.100***				0.570***			
	(0.164)				(0.154)				(0.144)			
In & Out AGOA		0.0904				-0.690***				0.0189		
		(0.393)				(0.194)				(0.256)		
Always in AGOA			-0.460*				-0.617***				0.634***	
			(0.180)				(0.158)				(0.171)	
EBA & AGOA				-1.528***				-0.829***				-0.334
				(0.204)				(0.190)				(0.209)
Constant	-2.604	-1.902	-3.222	-1.610	0.164	3.059	-1.797	1.353	5.407***	4.809**	5.621***	5.318***
	(2.359)	(2.539)	(2.432)	(2.207)	(1.359)	(1.572)	(2.045)	(1.948)	(1.459)	(1.533)	(1.462)	(1.417)
q75												
All AGOA	-0.196				-0.895***				0.705***			
	(0.212)				(0.182)				(0.137)			
In & Out AGOA		-0.958***				-1.487***				-0.435		
		(0.227)				(0.264)				(0.356)		
Always in AGOA			0.219				-0.398				0.693***	
			(0.361)				(0.285)				(0.138)	
EBA & AGOA				-1.118*				-0.973***				0.140
				(0.524)				(0.292)				(0.225)
Constant	-0.824	-0.847	-0.304	-0.534	1.879	5.713*	3.238	3.553	8.202***	5.713*	8.527***	5.202*
	(1.118)	(1.137)	(1.408)	(1.132)	(2.076)	(2.279)	(1.914)	(2.094)	(2.108)	(2.235)	(1.985)	(2.243)
q95												
All AGOA	0.224*				0.0463				0.972***			
	(0.111)				(0.231)				(0.251)			
In & Out AGOA		-1.630***				-2.104***				0.697*		
		(0.163)				(0.259)				(0.336)		
Always in AGOA			0.499**				0.581**				0.859**	
			(0.154)				(0.209)				(0.274)	
EBA & AGOA				1.346***				0.920				2.926**
				(0.262)				(0.593)				(0.910)
Constant	-3.677***	-3.287*	-3.107**	-3.593***	15.42***	16.22***	12.06***	15.83***	9.169***	8.979***	11.47***	9.526***
	(1.027)	(1.358)	(1.100)	(1.011)	(2.352)	(1.714)	(2.131)	(1.848)	(1.892)	(1.701)	(2.095)	(1.544)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080	1080

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. First four columns are for exports to the USA, second four columns are for USA/EU and last four columns are USA/ROW export ratios * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table D.31: Quantile regression estimates for exports to the USA: All countries

	(1) TALF	(2) AMDS	(3) FBTWP	(4) EI	(5) CPR	(6) ISOM	(7) METE	(8) OI
q25								
In & Out AGOA	-1.716***	-2.163***	-0.882*	1.570**	-0.770	-1.629***	-0.222	-0.232
	(0.324)	(0.382)	(0.394)	(0.569)	(0.398)	(0.476)	(0.257)	(0.308)
Constant	-24.07***	-8.466***	-12.97***	-28.59***	-23.60***	-16.98***	-9.430***	-16.29***
	(1.288)	(1.849)	(0.981)	(1.253)	(1.928)	(3.104)	(1.821)	(1.366)
q50								
In & Out AGOA	-2.970***	-2.626***	-0.899***	1.656***	-1.484***	-2.311***	-0.929**	-0.267
	(0.295)	(0.239)	(0.226)	(0.335)	(0.265)	(0.599)	(0.289)	(0.182)
Constant	-18.95***	-5.174***	-14.23***	-24.16***	-19.01***	-18.58***	-14.15***	-14.38***
	(1.455)	(0.838)	(0.863)	(1.373)	(0.970)	(1.429)	(1.388)	(0.744)
q75								
In & Out AGOA	-4.796***	-2.635***	-1.554***	0.906**	-1.123***	-1.166	-1.565***	-0.763***
	(0.528)	(0.417)	(0.388)	(0.303)	(0.316)	(1.183)	(0.218)	(0.203)
Constant	-11.52***	-0.868	-10.64***	-18.30***	-15.56***	-14.38***	-13.51***	-11.79***
	(2.081)	(0.925)	(1.661)	(2.491)	(0.961)	(1.237)	(1.011)	(0.929)
q95								
In & Out AGOA	-1.223	-1.688*	0.850	-1.313**	-2.630***	0.832*	-3.716***	-2.222***
	(0.777)	(0.679)	(0.488)	(0.441)	(0.526)	(0.391)	(0.393)	(0.315)
Constant	5.180*	-0.813	-0.474	-9.349**	-2.073	-2.856	-12.64***	-11.84***
	(2.408)	(0.720)	(0.684)	(3.074)	(3.652)	(2.428)	(2.657)	(1.574)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	989	1005	947	903	912	803	1021	1026

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table D.32: Quantile regression estimates for exports to the USA: All countries

	(1) TALF	(2) AMDS	(3) FBTWP	(4) EI	(5) CPR	(6) ISOM	(7) METE	(8) OI
q25								
All AGOA	-2.535***	-1.549***	-1.369***	-1.172**	-2.282***	-2.106***	-1.736***	-1.666***
	(0.272)	(0.236)	(0.199)	(0.411)	(0.354)	(0.352)	(0.213)	(0.177)
Constant	-20.47***	-6.932***	-11.42***	-26.04***	-21.73***	-14.46***	-10.79***	-14.82***
	(1.354)	(1.546)	(0.932)	(1.310)	(1.564)	(2.620)	(1.526)	(1.066)
q50								
All AGOA	-2.828***	-2.080***	-1.289***	0.366	-1.729***	-1.904***	-2.037***	-0.831***
	(0.291)	(0.219)	(0.158)	(0.311)	(0.225)	(0.362)	(0.188)	(0.150)
Constant	-17.74***	-4.338***	-13.47***	-23.17***	-16.26***	-16.38***	-11.75***	-13.68***
	(1.775)	(0.774)	(0.725)	(1.590)	(1.101)	(1.242)	(1.186)	(0.665)
q75								
All AGOA	-3.410***	-1.586***	-1.643***	0.874**	-1.311***	-0.0446	-1.676***	-1.130***
	(0.393)	(0.176)	(0.257)	(0.302)	(0.253)	(0.424)	(0.238)	(0.151)
Constant	-9.194***	0.170	-7.439***	-19.29***	-13.24***	-14.61***	-10.92***	-10.27***
	(1.927)	(1.079)	(1.991)	(2.247)	(1.431)	(1.321)	(1.321)	(1.037)
q95								
All AGOA	-1.775***	-2.240***	-0.642*	1.509***	-0.882*	0.0513	-2.903***	-1.703***
	(0.250)	(0.173)	(0.326)	(0.251)	(0.383)	(0.382)	(0.319)	(0.330)
Constant	12.41***	0.999	-0.292	-12.30***	-1.928	-1.208	-9.675***	-10.31***
	(3.117)	(0.992)	(1.019)	(1.477)	(3.408)	(2.978)	(2.140)	(1.736)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	989	1005	947	903	912	803	1021	1026

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table D.33: Quantile regression estimates for exports to the USA: All countries

	(1) TALF	(2) AMDS	(3) FBTWP	(4) EI	(5) CPR	(6) ISOM	(7) METE	(8) OI
q25								
EBA & AGOA	-1.661***	-0.104	-1.644***	-3.234***	-2.993***	-1.530**	-1.914***	-2.144***
	(0.431)	(0.276)	(0.247)	(0.529)	(0.311)	(0.572)	(0.277)	(0.174)
Constant	-25.78***	-10.09***	-11.43***	-25.15***	-23.08***	-16.78***	-10.43***	-15.10***
	(1.240)	(2.137)	(0.883)	(1.317)	(1.684)	(3.684)	(1.679)	(0.989)
q50								
EBA & AGOA	-1.617***	-0.312	-1.806***	-1.847**	-3.128***	-0.128	-2.262***	-2.116***
	(0.356)	(0.390)	(0.226)	(0.571)	(0.373)	(0.561)	(0.248)	(0.260)
Constant	-20.43***	-5.928***	-12.95***	-21.86***	-17.05***	-19.45***	-13.00***	-13.29***
	(1.628)	(1.121)	(0.942)	(1.909)	(1.013)	(1.415)	(1.320)	(0.617)
q75								
EBA & AGOA	-3.140***	-0.832***	-2.332***	-0.331	-1.940***	-0.0802	-1.953***	-1.550***
	(0.419)	(0.171)	(0.325)	(0.939)	(0.324)	(0.478)	(0.455)	(0.262)
Constant	-10.24***	-0.848	-8.581***	-16.23***	-13.51***	-14.18***	-11.66***	-9.715***
	(1.970)	(0.956)	(1.597)	(2.507)	(1.143)	(1.189)	(1.189)	(1.105)
q95								
EBA & AGOA	0.660	-2.096***	-0.642	1.277***	-3.801***	-0.986*	-2.716***	-2.406***
	(1.340)	(0.143)	(0.610)	(0.296)	(0.658)	(0.418)	(0.561)	(0.364)
Constant	-0.00700	-0.828	-0.292	-11.56***	-0.619	2.134	-8.873*	-9.899***
	(2.077)	(0.651)	(0.966)	(1.779)	(3.793)	(2.142)	(3.649)	(1.572)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	989	1005	947	903	912	803	1021	1026

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table D.34: Quantile regression estimates for exports to the USA: All countries

	(1) TALF	(2) AMDS	(3) FBTWP	(4) EI	(5) CPR	(6) ISOM	(7) METE	(8) OI
q25								
Always in AGOA	-1.623***	-0.872***	-1.174***	-1.243**	-2.567***	-1.024*	-1.575***	-1.872***
	(0.407)	(0.263)	(0.268)	(0.391)	(0.359)	(0.428)	(0.243)	(0.140)
Constant	-24.48***	-9.380***	-11.75***	-26.44***	-23.82***	-18.12***	-12.08***	-15.88***
	(1.316)	(1.746)	(1.002)	(1.271)	(1.648)	(3.303)	(1.438)	(0.788)
q50								
Always in AGOA	-1.674***	-1.502***	-1.000***	0.237	-1.602***	-0.826	-1.793***	-0.963***
	(0.289)	(0.319)	(0.186)	(0.433)	(0.285)	(0.463)	(0.205)	(0.242)
Constant	-19.28***	-5.181***	-14.15***	-22.69***	-17.59***	-18.48***	-13.76***	-14.04***
	(1.377)	(1.089)	(0.675)	(1.757)	(1.170)	(1.400)	(1.217)	(0.756)
q75								
Always in AGOA	-2.225***	-1.278***	-1.127***	0.592	-1.236***	0.680	-1.081***	-0.902***
	(0.555)	(0.163)	(0.258)	(0.444)	(0.241)	(0.376)	(0.252)	(0.147)
Constant	-11.79***	-1.057	-9.849***	-17.41***	-14.80***	-14.33***	-12.21***	-11.46***
	(1.881)	(1.037)	(1.856)	(2.398)	(1.288)	(1.081)	(1.195)	(1.026)
q95								
Always in AGOA	-1.245**	-2.268***	-0.864***	2.045***	-1.251*	-0.378	-2.622***	-0.666
	(0.397)	(0.137)	(0.212)	(0.245)	(0.521)	(0.252)	(0.270)	(0.549)
Constant	7.170*	-0.715	0.591	-12.70***	-4.123	-0.0549	-11.18***	-11.12***
	(3.408)	(0.675)	(1.140)	(1.239)	(3.691)	(2.141)	(1.917)	(1.917)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	989	1005	947	903	912	803	1021	1026

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. AMDS–Agriculture, meat and dairy, seafood; FBTWP–Food, beverages, tobacco, wood, paper; EI–Extractive industries; CPR–Chemicals, plastics, rubber; TALF–Textiles, apparel, leather, footwear; ISOM–Iron, steel, and other metals; METE–Machinery, electronics, transportation equipment; OI–Other industries.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Further Robustness Checks (Panel Data): excluding selected products and top 5 AGOA countries and comparison with CBTPA countries

Table D.35: Quantile regression: Excluding key products

	(1) Exports	(2) Exports	(3) Exports	(4) Exports	(5) Exports	(6) Exports	(7) Exports	(8) Exports
q25								
All AGOA	-0.0284				-0.506*			
	(0.229)				(0.236)			
In & Out AGOA		0.499				0.388		
		(0.585)				(0.438)		
Always in AGOA			-0.0238				-0.698	
			(0.342)				(0.377)	
EBA & AGOA				-0.475				-1.673***
				(0.267)				(0.406)
Constant	-42.62***	-54.65**	-35.24***	-28.42**	-23.89***	-56.66***	-30.42**	-9.040
	(5.767)	(17.306)	(9.614)	(9.055)	(5.999)	(12.398)	(11.263)	(10.693)
q50								
All AGOA	-0.901***				-1.004***			
	(0.223)				(0.292)			
In & Out AGOA		-0.249				-0.302		
		(0.477)				(0.387)		
Always in AGOA			-0.963***				-1.149***	
			(0.200)				(0.241)	
EBA & AGOA				-0.922***				-1.692***
				(0.243)				(0.271)
Constant	-39.97***	-55.65***	-40.02***	-45.56***	-39.53***	-67.22***	-44.08***	-32.92***
	(4.124)	(7.878)	(6.420)	(6.873)	(6.998)	(6.788)	(4.254)	(6.141)
q75								
All AGOA	-0.840**				-1.596**			
	(0.263)				(0.546)			
In & Out AGOA		-0.219				-1.545*		
		(0.669)				(0.763)		
Always in AGOA			-0.848***				-1.389***	
			(0.230)				(0.341)	
EBA & AGOA				-0.789				-1.329*
				(0.472)				(0.565)
Constant	-37.09***	-39.99***	-37.85***	-37.32***	-43.42***	-56.62***	-39.22***	-34.55***
	(3.820)	(6.491)	(3.898)	(5.580)	(7.352)	(9.390)	(4.864)	(5.185)
q95								
All AGOA	-0.551***				-2.082***			
	(0.144)				(0.194)			
In & Out AGOA		-1.429***				-2.806***		
		(0.327)				(0.269)		
Always in AGOA			-2.513***				-2.735***	
			(0.425)				(0.519)	
EBA & AGOA				-0.881				-1.048
				(0.520)				(0.864)
Constant	-36.63***	-21.92***	-29.15***	-47.28***	-33.92***	-40.70***	-37.37***	-54.62***
	(3.516)	(6.035)	(5.397)	(4.200)	(3.720)	(7.808)	(5.079)	(9.530)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	744	405	614	494	738	402	614	494

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports less extractive industry exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. First four columns are for No programme exports, second four are for GSP and last four are for NonGSP exports * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table D.36: Quantile regression estimates for exports to the USA (excluding top five AGOA exporters)

	(1) Exports	(2) Exports	(3) Exports	(4) Exports
q25				
All AGOA	-0.121			
	(0.226)			
In & Out AGOA		0.0482		
		(0.502)		
Always in AGOA			-0.256	
			(0.279)	
EBA & AGOA				-0.995***
				(0.221)
Constant	-40.06***	-43.41***	-45.83***	-40.26***
	(6.021)	(6.724)	(5.803)	(5.587)
q50				
All AGOA	-0.431**			
	(0.148)			
In & Out AGOA		0.581		
		(0.312)		
Always in AGOA			-0.593***	
			(0.152)	
EBA & AGOA				-1.390***
				(0.212)
Constant	-37.77***	-39.50***	-42.08***	-34.46***
	(3.755)	(4.653)	(5.174)	(6.087)
q75				
All AGOA	-0.155			
	(0.178)			
In & Out AGOA		-0.159		
		(0.244)		
Always in AGOA			-0.370	
			(0.348)	
EBA & AGOA				-1.603***

				(0.154)
Constant	-22.73***	-23.80***	-25.18***	-20.70***
	(3.373)	(5.010)	(3.153)	(3.428)
q95				
All AGOA	0.108			
	(0.311)			
In & Out AGOA		-1.273***		
		(0.232)		
Always in AGOA			0.683	
			(0.355)	
EBA & AGOA				1.087
				(1.070)
Constant	-24.68***	-11.06	-28.73***	-23.87***
	(5.154)	(6.147)	(4.639)	(6.462)
Year	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	694	624	654	644

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports excluding top five AGOA exporters. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. First four columns are for exports to the USA, second four columns are for USA/EU and last four columns are USA/ROW export ratios * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table D.37: Quantile regression estimates for excluding top five AGOA and key products

	(1) Exports	(2) Exports	(3) Exports	(4) Exports	(5) Exports	(6) Exports	(7) Exports	(8) Exports
q25								
All AGOA	0.186				-0.419*			
	(0.228)				(0.212)			
In & Out AGOA		0.332				0.860***		
		(0.300)				(0.211)		
Always in AGOA			0.121				-0.673**	
			(0.191)				(0.214)	
EBA & AGOA				-0.318				-1.870***
				(0.237)				(0.285)
Constant	-45.87***	-46.66***	-45.72***	-46.64***	-26.98***	-37.46***	-33.42***	-49.57***
	(6.589)	(4.070)	(7.046)	(4.892)	(6.162)	(8.563)	(9.842)	(9.444)
q50								
All AGOA	-0.557***				-0.724*			
	(0.162)				(0.325)			
In & Out AGOA		0.422				0.706*		
		(0.333)				(0.288)		
Always in AGOA			-0.550***				-1.113***	
			(0.117)				(0.184)	
EBA & AGOA				-0.934***				-1.356***
				(0.217)				(0.206)
Constant	-42.94***	-52.86***	-47.94***	-48.78***	-45.00***	-58.21***	-50.41***	-46.58***
	(5.506)	(4.044)	(3.982)	(3.848)	(6.338)	(4.894)	(5.674)	(6.243)
q75								
All AGOA	-0.596*				-1.126***			
	(0.296)				(0.339)			
In & Out AGOA		0.974				-0.739		
		(0.653)				(0.402)		
Always in AGOA			-0.766**				-0.532	
			(0.243)				(0.358)	
EBA & AGOA				-0.760*				-0.780**
				(0.321)				(0.301)
Constant	-41.67***	-46.17***	-41.38***	-42.70***	-49.51***	-55.16***	-55.37***	-52.81***
	(4.121)	(4.125)	(4.671)	(4.447)	(3.925)	(2.353)	(3.756)	(5.545)
q95								
All AGOA	-0.430*				-1.831***			
	(0.167)				(0.304)			
In & Out AGOA		-0.0968				-2.488***		
		(0.195)				(0.380)		
Always in AGOA			-1.512**				-1.141**	
			(0.509)				(0.376)	
EBA & AGOA				-0.134				-0.728
				(0.497)				(0.558)
Constant	-36.90***	-40.07***	-39.34***	-41.58***	-34.57***	-68.68***	-59.82***	-59.38***
	(3.777)	(5.274)	(3.792)	(5.626)	(3.677)	(4.739)	(6.435)	(7.567)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	694	624	654	644	688	621	651	641

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is exports. Quantiles selected are .25, .50 .75 & .95. Controls include: English, Spanish & landlocked dummies, logs of distance (weighted), area & GDP. 'All' indicates that all AGOA beneficiaries are included irrespective of whether they are removed from the programme. 'In & Out' are countries that are removed from the programme at least once. 'Always' are countries that have consistently been recipients from the beginning of the programme (i.e. from 2001/2003). 'EBA & AGOA' are countries that are both members of AGOA and EBA and have continuously been beneficiaries. First four columns are for exports to the USA, second four columns are for USA/EU and last four columns are USA/ROW export ratios * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table D.38: Robustness: Quantile regression estimates–fuel and apparel & textile exports, 1975 - 2012

	(1) Fuel[1]	(2) Textile[1]	(3) Fuel[2]	(4) Textile[2]	(5) Fuel[3]	(6) Textile[3]
AGOA Treatment	0.0908	-2.031***	-0.440	-2.830***	0.536	-1.885***
	(1.497)	(0.463)	(1.026)	(0.709)	(1.307)	(0.451)
Constant	-90.30***	-69.68***	-29.40	-73.97***	-36.79	-58.94***
	(16.821)	(5.815)	(27.736)	(10.117)	(23.983)	(7.737)
q50						
AGOA Treatment	0.764	-2.692***	3.443***	-3.765***	1.592	-2.887***
	(0.805)	(0.303)	(0.952)	(0.481)	(0.930)	(0.301)
Constant	-39.03***	-58.88***	-41.54***	-48.42***	-31.98**	-51.88***
	(7.348)	(3.527)	(9.032)	(6.360)	(11.184)	(4.518)
q75						
AGOA Treatment	1.949**	-2.909***	7.605***	-4.031***	2.994***	-2.768***
	(0.595)	(0.384)	(1.005)	(0.412)	(0.877)	(0.336)
Constant	4.251	-55.39***	-11.76	-45.26***	2.172	-43.88***
	(6.051)	(2.826)	(20.380)	(4.836)	(9.697)	(3.674)
q90						
AGOA Treatment	2.340***	-2.519***	5.538***	-3.998***	2.414***	-2.785***
	(0.484)	(0.334)	(1.629)	(0.548)	(0.680)	(0.355)
Constant	0.574	-59.44***	-30.16	-53.29***	-26.10	-47.27***
	(14.480)	(3.249)	(20.126)	(6.524)	(20.115)	(3.273)
q95						
AGOA Treatment	1.477**	-2.811***	4.142**	-3.814***	1.904**	-2.598***
	(0.547)	(0.321)	(1.266)	(0.548)	(0.601)	(0.320)
Constant	29.25	-53.73***	-23.45	-42.09***	8.143	-40.40***
	(15.808)	(2.065)	(20.590)	(9.413)	(24.520)	(3.243)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Mundlak	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1920	2000	820	768	1314	1313

Bootstrapped standard errors with 500 replications in parenthesis. Dependent variables is imports by USA. Quantiles selected are 0.25, 0.50 0.75 0.90 & 0.95. Other Controls not shown include: log of weighted distance, log of area, English, Spanish & landlocked dummies. AGOA dummy = 1 in year of provision and zero otherwise. Countries provided AGOA in December of the year of provision are coded as having AGOA the following year. [1]: Data is for the period 1975 - 2012. [2]: Data is for the period 2000 - 2012. [3]: Data is for the period 1990 - 2012. Apparel & Textile products are based on SITC 26–clothing, 65–textile, yarn, fabrics, made up articles, etc. & 84–textile fibres, not manufacture & waste; Fuel products based on SITC 3–Mineral fuels, lubricants and related materials (SITC Rev. 1). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table D.39: Robustness: Fixed effects and Poisson pseudo maximum likelihood estimates–Non-Oil vs. Total exports for exports to the USA

	(1) Non-Oil-FE[1]	(2) Total-FE[1]	(3) Non-Oil-FE[2]	(4) Total-FE[2]	(5) Non-Oil-PPMLE[1]	(6) Total-PPMLE[1]	(7) Non-Oil-PPMLE[2]	(8) Total-PPMLE[2]
AGOA Treatment	-0.785**	-0.381	0.396	0.134	-0.0557***	-0.0101	-0.0531***	-0.00251
	(0.242)	(0.333)	(0.299)	(0.284)	(0.006)	(0.007)	(0.007)	(0.009)
Constant	-4.403	-4.762	10.43	0.970	-0.113	0.590***	-0.0937	0.670***
	(5.318)	(6.568)	(6.983)	(11.831)	(0.095)	(0.093)	(0.154)	(0.155)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	No	No	No	Yes	Yes	Yes	Yes
Observations	2295	2295	820	820	2295	2295	756	756
Countries	65	65	65	65				

Robust standard errors with clustering based on country in parenthesis. Dependent variables is imports by USA. AGOA dummy = 1 in year of provision and zero otherwise. Other controls for PPMLE include: English, Spanish & landlocked dummies. Countries provided AGOA in December of the year of provision are coded as having AGOA the following year. [1]: Data is for the period 1975 - 2012. [2]: Data is for the period 2000 - 2012. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table D.40: Robustness: Fixed effects and Poisson pseudo maximum likelihood estimates–fuel and apparel & textile exports to the USA

	(1) Fuel-FE[1]	(2) Textile-FE[1]	(3) Fuel-FE[2]	(4) Textile-FE[2]	(5) Fuel-PPMLE[1]	(6) Textile-PPMLE[1]	(7) Fuel-PPMLE[2]	(8) Textile-PPMLE[2]
AGOA Treatment	0.670	-0.437	-1.802	0.0703	0.134***	-0.156***	0.221***	-0.204***
	(1.367)	(0.431)	(1.191)	(0.358)	(0.022)	(0.018)	(0.033)	(0.023)
Constant	-64.02*	19.25*	-39.80	29.64	2.849***	-2.637***	2.529***	-2.121***
	(30.647)	(8.702)	(52.254)	(18.610)	(0.237)	(0.197)	(0.373)	(0.344)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	No	No	No	Yes	Yes	Yes	Yes
Observations	1920	2000	820	768	1131	2000	413	768
Countries	65	65	65	65				

Robust standard errors with clustering based on country in parenthesis. Dependent variables is imports by USA. AGOA dummy = 1 in year of provision and zero otherwise. Other controls for PPMLE include: English, Spanish & landlocked dummies. Countries provided AGOA in December of the year of provision are coded as having AGOA the following year. [1]: Data is for the period 1975 - 2012. [2]: Data is for the period 2000 - 2012. Apparel & Textile products are based on SITC 26–clothing, 65–textile, yarn, fabrics, made up articles, etc. & 84–textile fibres, not manufacture & waste; Fuel products based on SITC 3–Mineral fuels, lubricants and related materials (SITC Rev. 1). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table D.41: A comparison of estimates: Quantile Regression, Penalized Fixed Effects (PFE), Mundlak and ordinary Fixed Effect (OFE) regressions

	Penalized Fixed effects				Mundlak	Mundlak	Fixed Effects	Fixed Effects
	Coeff.	Std. Error	t value	Pr(> |t|)				
USA (common support), $\lambda = 5$								
(Intercept)[0.25]	-46.180	6.636	-6.959	0.000	-39.33***	-39.12***	-29.67***	-31.41***
All AGOA[0.25]	-0.183	0.322	-0.568	0.570	-0.163	-0.288	0.278	0.177
(Intercept)[0.5]	-38.785	5.784	-6.706	0.000	-39.17***	-38.70***	-28.35**	-22.78*
All AGOA[0.5]	-0.288	0.315	-0.914	0.361	-0.118	-0.0759	0.342	-0.240
(Intercept)[0.75]	-35.249	5.545	-6.357	0.000	-22.96***	-23.87***	-37.59***	-33.58***
All AGOA[0.75]	-0.357	0.332	-1.075	0.283	0.189	0.150	-0.351	-0.881*
(Intercept)[0.95]	-29.785	8.827	-3.374	0.001	-23.53***	-24.19***	-33.40***	-27.82***
All AGOA[0.95]	-0.623	0.499	-1.249	0.212	0.688***	0.699***	-0.545	-1.107***
USA (common support), $\lambda = 3$								
(Intercept)[0.25]	-41.539	5.836	-7.117	0.000	-39.33***	-39.12***	-29.67***	-31.41***
All AGOA[0.25]	-0.447	0.277	-1.616	0.107	-0.163	-0.288	0.278	0.177
(Intercept)[0.5]	-38.568	5.044	-7.646	0.000	-39.17***	-38.70***	-28.35**	-22.78*
All AGOA[0.5]	-0.616	0.260	-2.366	0.018	-0.118	-0.0759	0.342	-0.240
(Intercept)[0.75]	-33.693	4.832	-6.972	0.000	-22.96***	-23.87***	-37.59***	-33.58***
All AGOA[0.75]	-0.589	0.263	-2.245	0.025	0.189	0.150	-0.351	-0.881*
(Intercept)[0.95]	-27.779	6.247	-4.447	0.000	-23.53***	-24.19***	-33.40***	-27.82***
All AGOA[0.95]	-0.874	0.334	-2.621	0.009	0.688***	0.699***	-0.545	-1.107***
USA (All countries), $\lambda = 5$								
(Intercept)[0.25]	-4.591	3.728	-1.232	0.218	-14.02***	-13.68***	-0.836	40.38***
All AGOA[0.25]	-0.508	0.300	-1.690	0.091	-0.455**	-0.470**	1.945**	0.730
(Intercept)[0.5]	-0.745	3.038	-0.245	0.806	-1.869	-2.065	-1.011	39.17***
All AGOA[0.5]	-0.530	0.274	-1.935	0.053	-0.346*	-0.355*	1.622*	0.559
(Intercept)[0.75]	-1.057	2.736	-0.386	0.699	-0.964	-0.532	3.660	38.13***
All AGOA[0.75]	-0.548	0.273	-2.008	0.045	-0.196	-0.132	1.513*	1.988**
(Intercept)[0.95]	-1.419	2.556	-0.555	0.579	-3.561**	-2.478**	1.557	34.12***
All AGOA[0.95]	-0.634	0.361	-1.754	0.080	0.224	0.319**	0.712	1.178*
USA (All countries), $\lambda = 3$								
(Intercept)[0.25]	2.876	2.870	1.002	0.317	-14.02***	-13.68***	-0.836	40.38***
All AGOA[0.25]	-0.515	0.252	-2.045	0.041	-0.455**	-0.470**	1.945**	0.730
(Intercept)[0.5]	4.230	2.378	1.779	0.076	-1.869	-2.065	-1.011	39.17***
All AGOA[0.5]	-0.580	0.228	-2.541	0.011	-0.346*	-0.355*	1.622*	0.559
(Intercept)[0.75]	5.031	2.154	2.336	0.020	-0.964	-0.532	3.660	38.13***
All AGOA[0.75]	-0.565	0.228	-2.475	0.014	-0.196	-0.132	1.513*	1.988**
(Intercept)[0.95]	4.863	2.360	2.060	0.040	-3.561**	-2.478**	1.557	34.12***
All AGOA[0.95]	-0.544	0.280	-1.941	0.053	0.224	0.319**	0.712	1.178*
Controls	Yes				Yes	Yes	Yes	Yes
Year Dummies	No				Yes	No	Yes	No
Fixed Effects	Yes				No	No	Yes	Yes

Bootstrapped standard errors with 500 replications (also for Mundlak & fixed effects estimates but are not shown). Quantile is indicated in square brackets in the first column. Dependent variable is exports to the USA. Koenker's Penalized Fixed Effect (PFE) estimates are obtained from the package "rqpd" in R, all remaining estimates are obtained using the Stata statistical software. We were unable to obtain estimates with time dummies based on the penalized fixed effects estimator, hence, these are not reported. Those of the two other estimators are reported. The control variables are the same as in the text: English, Spanish & landlocked dummies, logs of weighted distance, area. Estimates are based on the minimized Gaussian l_1 penalty $\min_{(\alpha,\beta)} \sum_{k=1}^{q} \sum_{j=1}^{n} \sum_{i=1}^{m} w_k \rho_{\tau_k}(y_{ij} - \alpha_i - x_{ij}^T \beta(\tau_k)) + \lambda \sum_{i=1}^{n} |\alpha_i|$. The λ choices used are $\lambda = 3$ & $\lambda = 5$. As $\lambda \to \infty$ the fixed effects $\hat{\alpha}_i \to 0$, for all i's. The difference across the coefficients in the last two columns for the ordinary fixed effects estimation is larger compared to the difference across the Mundlak estimates. On the contrary, for the Mundlak estimates, there are a few cases where the estimates are similar and only marginally different. This indicates that for the ordinary fixed effects the inclusion of additional variables can lead to wide swings in the estimates. Unfortunately, we are unable to show this for the PFE, but then we expect adding additional sets of variables to affect the coefficient estimates. This makes the estimates of the Mundlak random effects more stable across different parameterizations of our model. Additionally, the Mundlak estimates in several cases are closer to the PFE estimates than the ordinary fixed effects estimator. This indicates that there is some parameterization of λ that would yield estimates similar to those of the Mundlak estimator. For now, the ordinary fixed effects estimates can be taken as the upper bound while our PFE estimates provide the lower bound of the impact.